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THE PANAMA CANAL AND THE LUMBER TRADE

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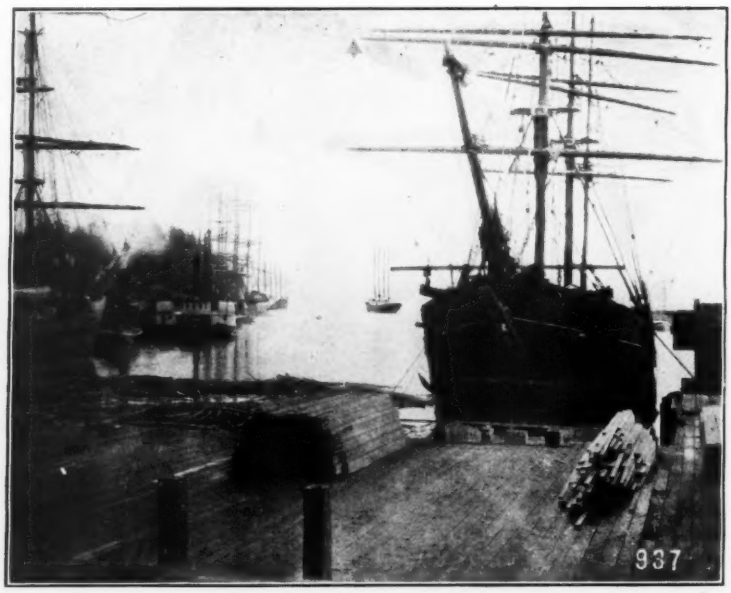
THE influence the opening of the Panama Canal will have upon certain industries in this country has furnished a fruitful topic of discussion for some time. It is probable that no class of business men have looked forward with greater hopes of increased commercial activity than have the lumber producers of the Pacific Coast, who for several years have been struggling to make ends meet in their business.

There are some who feel that the lower water rate which will prevail when the Canal is open, should permit Pacific Coast operators not only to enter the eastern tidewater markets but they also foresee the possibility of delivering lumber, without rehandling, to Canal boats at Albany, New York, at the terminus of the Erie Canal from which point it may be distributed to the large consuming districts tributary to it. This would not only open a large rural market in New York state but would permit them to invade the famous stronghold of eastern white pine, namely the Tonawandas at the western end of the canal. By reloading at this point, lumber could be forwarded by an all-water route from Pacific Coast points to the large lumber consuming centers on the Great Lakes, including Chicago, the largest lumber market in the United States.

That this dream of conquest will materialize in the next decade seems doubtful, although it may well come true when the supply of eastern woods is reduced.

The reasons why western lumbermen are so keenly interested in the Panama Canal as a market stimulus is that the lumber industry on the western slope of the Rocky Mountains has been in a somewhat demoralized condition due to the low average price which lumber has brought to the manufacturer f.o.b. car at the mill. Competition with other woods, especially southern yellow pine, coupled with a very high freight rate for points east of the Rocky Mountains has narrowed the boundaries of their domestic market to such an extent that only the better grades of lumber could be manufactured and sold at a profit. The prosperous business conditions previous to 1907 led some to make heavy investments in manufacturing plants and others in stumpage, and to-day with depressed market conditions many operators find themselves forced either to close their plants, if they can do so and avoid bankruptcy, or else manufacture lumber at a loss and thus secure a little ready money with which to meet obligations.

A somewhat unique situation exists in the territory tributary to the Columbia river, Puget Sound and other coast points in that the logging and manufacturing interests are usually conducted under separate management, even though both may be controlled directly or indirectly by the same interests. The logger harvests his timber and places the logs on the market often through some log-selling agency, the logs being bought on grade and manufactured by the mills. This sepa-



THE DOCKS AND LUMBER PILES OF THE PORT BLAKELY MILL.

ration of woods and mill work is not common in any other forest region.

Many mills have been closed or running on part time during the last few months because the operating costs often nearly equalled and sometimes exceeded the sale value of the lumber. Although the price of logs has been low the loggers have been able to keep their camps running without as great loss as that sustained by the mill men since loggers have been able to realize some profit on their stumpage even at the low price which the logs have brought.

The condition of the lumber market is reflected in the statement of an official of a large plant, located on tidewater, which closed down some months ago. "Business conditions in the West, as far as lumber goes, are poorer then during the 1907-1908 panic. Our selling average since May has been from $10 to $11.25 per M. Logs cost us about $9." This condition prevails in the shingle trade as well as with lumber, a manufacturer recently stating that during the past year his average percentage of grades of shingles manufactured had been 95 per cent of the best and 5 per cent of the second grade, although the normal per cent of production should have been 60 per cent and 40 per cent, respectively. The company wasted material that would have made the extra 35 per cent of the second grade, and when they offered at cost the 5 per cent which they actually manufactured, they could not sell them.

A recent writer on Pacific Coast conditions states that about 25 per cent of the lumber cut of Washington and Oregon goes by water to domestic and foreign ports, 25 per cent is consumed locally and the remainder is shipped by rail to points East and South, chiefly west of Denver, less than 2 per cent going to points East of the Missouri River.

While softwood lumber is marketed all over the United States, the best territory outside of the home states is the great agricultural region of the Middle West which has no forest resources; the vast area east of Chicago and north of the Ohio river, once heavily forested but now largely cut-

DOUGLAS FIR, OF WHICH MORE LUMBER IS CUT IN THIS COUNTRY THAN OF ANY OTHER SPECIES, BEING LOADED AT TACOMA, WASH.

NOTE THAT THE VESSELS ARE BUILT TO CARRY A HEAVY DECK LOAD IN ADDITION TO THAT IN THEIR HOLD. DOUGLAS FIR IS NOW IN DEMAND IN THE EASTERN STATES AND IN MOST TIMBER IMPORTING COUNTRIES.

LUMBER MILL AT FAIRBANKS IN THE INTERIOR OF ALASKA WHICH CUTS TIMBER FOR LOCAL USE. THE FORESTS IN THIS PART OF THE COUNTRY SUFFER GREATLY FROM FIRES. THOSE ON THE COAST ARE LESS LIKELY TO BE BURNED BECAUSE OF THE MORE MOIST ATMOSPHERIC CONDITIONS.

over and in which the demand for lumber for manufacturing and other purposes far exceeds the local production and the area west of the Mississippi River and east of the Rocky Mountains, including Texas, Colorado, Kansas, Nebraska and the Dakotas which have only limited supplies in restricted sections.

The value of the eastern states as a market for outside lumber is shown by the fact that seven states tributary to New York and Philadelphia consume about six billion feet of lumber in excess of the local production, and the area within a radius of one hundred miles of New York consumes as much lumber as the territory comprised in an area within a radius of fifteen hundred miles from Seattle.

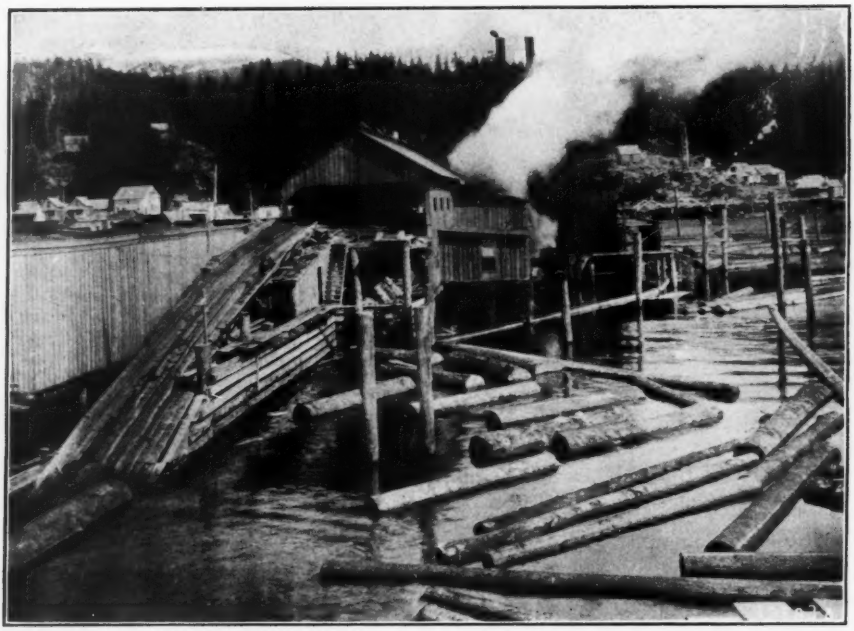
The territory west of the Mississippi river is the fighting ground of the yellow pine and Douglas fir trade with some competition in the north from white pine products. West of Denver the Pacific coast products have but little competition but east to the Missouri river the competition grows more keen as the freight haul from the West increases. Beyond this point the territory is given over chiefly to southern yellow pine and to white pine.

Freight rates are the dominating factor in determining the territory in which a product can be sold profitably. As illustrating this the rates for Douglas fir from Washington and on southern yellow pine from the South may be cited. The all-rail rate on fir products is 75 cents per 100 pounds from the Pacific Coast to New York, which on flooring, per thousand board feet, amounts to approximately $15, on dimension and common boards from $18. to $19.50, on timbers, not green about $22.50, and on rough green lumber and timbers about $24.75. The all-rail rate from points in Louisiana which ship yellow pine lumber to the same point as that mentioned for fir is 35 cents per 100 pounds, which is approximately $7.75 per thousand board feet for longleaf pine flooring, $9.50 on dimension and common boards, and $15.75 on heavy timbers.

This gives the yellow pine manufacturers an advantage in freight rate alone of $7.25 on flooring, from $8.50 to $10. on dimension and common boards, and $9 on timbers. This handicap for fir timber is so great that only a very limited amount of the better grades can now be sent by the all-rail route.

Within the last year or two a very limited quantity of fir lumber has found

LUMBER DOCK AT SAVANNAH, GA., FROM WHICH YELLOW PINE TIMBER IS SHIPPED FOR BOTH COASTWISE AND FOREIGN TRADE.

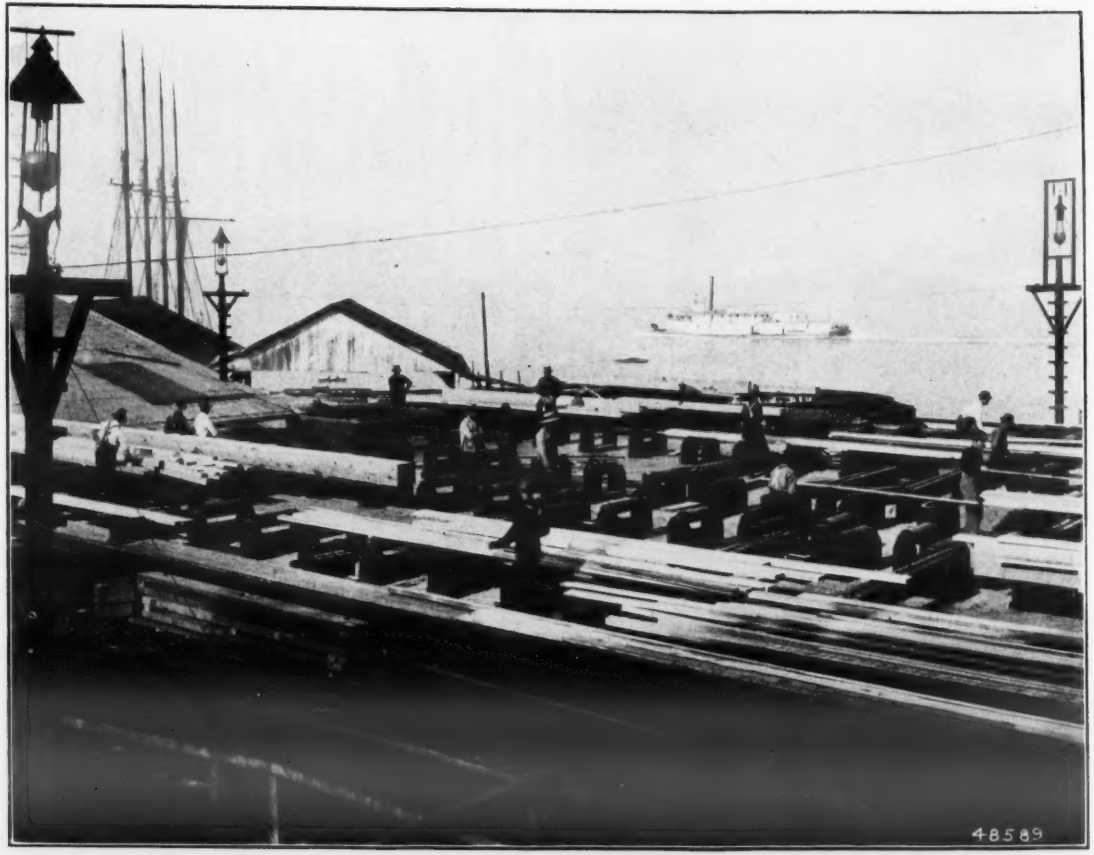


A LUMBER MILL ON THE TONGASS NATIONAL FOREST, SOUTHEAST ALASKA.
The logs are floated to the mill on the same waters on which their material is later transported as finished lumber. The Alaska National forests are now self supporting and cut material for local use to make boxes for the salmon canneries. A heavy production of pulp is promised from these forests which may be marketed in the east by means of the Panama canal. This forest is at Ketchikan.

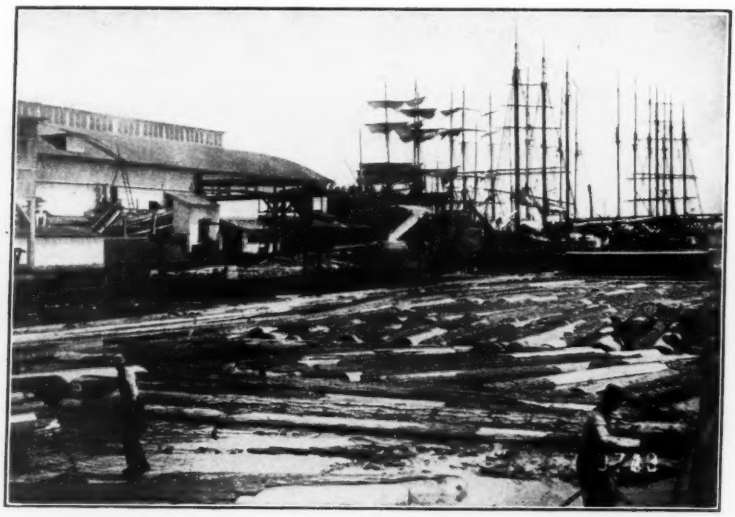
its way into the eastern markets via the Isthmus of Panama, due to a combination rail and water rate of from 40 to 50 cents per 100 pounds from Puget Sound points to New York. This rate was inaugurated by a steamship company operating on the Pacific Coast. Lumber has been reshipped from the Atlantic seaboard as far west as Buffalo at a cost of $125. per car less than it could have been sent by an all-rail route. The amount of lumber sent by the water route has been small because of the limited facilities available, so that this means of transport, has had no effect on transcontinental rail rates.

The question of what water rates will apply from the West Coast to the eastern seaboard, via the Panama Canal, is yet undecided, but it has been estimated that American ships will charge from $11 to $12 per thousand board feet for this service. It is doubtful if the amount of lumber traffic through the Canal from West to East will assume large proportions, at least for some time after the opening of the Canal, because of the lack of suitable American bottoms in which to carry the product. While there are some new lumber carriers now under construction for the canal trade, the total carrying capacity will not be such as to make a very strong impression on eastern markets.

Another important factor is the lack of adequate lumber handling facilities at many of the Atlantic coast ports. A large part of the water shipments which now come both from Canada and from the yellow pine region of the South are in comparatively small cargoes made up of parcel lots which are delivered at various docks. The lumber is also often in mixed lots destined for interior rail trade. Large vessels carrying cargoes of from four to six million feet, which are desirable for long shipments, will find few ports where there are



A Lumber Wharf Scene at Tacoma, Wash., With the Rollers on Which Douglas Fir Planking and Heavier Timbers May Be Readily Handled. In the distance a stern wheel steamer of the type common on puget sound and the rivers which empty into it.



LUMBER MILLING AND TRANSPORTATION ON THE NORTHWEST COAST.
In the foreground is the log pond from which the material is supplied to the mill. In the background is the lumber fleet which takes the product of the mill to distant ports. Port Blakely, Kitsap Co., Washington.

sufficiently large receiving yards to permit of the rapid unloading of the vessel, and there will be little encouragement for the owners of lumber carriers of large capacity to engage in lumber transport until this condition is remedied.

The laws of the United States regulating coast-wise traffic require that the products shall be carried in American bottoms and this fact alone will be deterrent to the rapid expansion of the estern trade because of the limited tonnage of vessels available and because of the greater expense of operating such vessels as compared to those of foreign registry which may carry lumber from British Columbia to our eastern seaboard. Cheaper operating labor costs are due to the employment of Asiatic labor, lower interest charges on the investment, and a lower insurance rate. According to a statement of the president of a large steamship company on the Pacific Coast, the reduced expense of foreign vessels will permit the shipment of lumber from western Canada, via Panama Canal, to the Atlantic seaboard for about $10 per thousand board feet, canal tolls included. If this low rate is made for foreign vessels, the eastern markets will be more advantageous for our Canadian cousins than for the lumber manufacturers of the Northwest. An added advantage has been granted to Canadian lumbermen through the passage of the Underwood-Simmons Tariff Bill which has removed the $1.25 duty on lumber, now admitting lumber into this country free of charge.

While it is admitted by all that the wood products of the western forests will supply a large part of the eastern requirements at some future time, due to the gradual exhaustion of timber near-by yet this change, even with favorable water rates from coast to coast will only come about gradually for several reasons. The eastern trade is conservative and has been held for many years by local and by southern lumber manufacturers who have established trade connections and who have carefully studied the requirements of the various classes of consumers. The Pacific Coast manufacturers will find that it will be dificult to overcome these handicaps, unless they can offer a superior article at a lower price. This will hold true so far as ordinary lumber

SITKA SPRUCE LOGS IN THE SAWMILL, BOX FACTORY AND BOAT BUILDING PLANT AT PORT GRAVINA ISLAND, ALASKA.

products are concerned, but even now the West is gradually taking over the trade in heavy timbers since the South, which formerly supplied a large part of this class of material, finds that its supply of stumpage suitable for this purpose is largely exhausted. The eastern market for flooring, finishing and common construction lumber will not be surrendered without a struggle, and it is doubtful if a large part of the trade can be wrested from the southern pine manufacturers until their supply of stumpage becomes so depleted that they, of necessity, must give up some of their more distant markets.

It is not anticipated that fir lumber can influence to any degree the yellow pine trade in the great prairie states of the Middle West, which for many years received vast quantities of lumber from the Lake States, but which in recent times have relied on the South to supply their needs. The mills in Arkansas and Louisiana, for instance, now get into the Chicago market on an average rate of 24 cents per 100 pounds, while the rail rate from the coast is 55 cents. Even though a very favorable water rate were granted from the West via the Canal, Pacific Coast lumber could not get into these markets as readily as yellow pine, since the railrate from Gulf or Atlantic ports would be equal to the rate now paid from southern mills and, in addition, the western product would have to pay the water rate and handling charges at the point of transfer. From the standpoint of the yellow pine operator, in fact also from the standpoint of the Coast manufacturer as well, a most hopeful sign is that the home demand for lumber in the southern states is increasing at a very rapid rate and in another decade it is reasonably certain that a very large per cent of the lower grades produced at southern pine mills will be marketed at home on a low freight rate, thus automatically withdrawing this product from competition with Douglas fir in other sections.

There is little likelihood of any important movement of timber via water from the East to the West, although a new field for southern hardwoods will be open on the Pacific Coast. The very high freight rates now charged for transporting hardwoods from the Mississippi valley to the western part of the United States practically precludes their use except in the best class of buildings. It is now cheaper to import hardwoods from Asiatic countries than it is to bring native hardwoods over the Rocky Mountains by rail.

While the western tide-water mills will probably be benefited directly to a greater degree than the interior mills

LOADING EASTERN LUMBER AT TIDEWATER AND LUMBER SCHOONERS TAKING ON CARGO AT BANGOR, ME.

by the opening of the Canal, yet the latter also should have an increased field in which to market their products, or at least their present field should be freed from a certain amount of competition which it now meets from the tide-water plants. Most of the Coast mills have rail as well as water connections and cater to the cargo or rail trade depending on which market is the better for the time being. With an enlarged field for their cargo trade the Coast mills will to a large extent abandon their rail trade and leave it unmolested to the interior mills. It is also probable that a greater amount of cargo trade will develop for certain species, such as western white pine, which is manufactured exclusively by the rail mills. This wood is now in demand in the East as a substitute for eastern white pine and even today the cargo trade in this wood is of considerable importance. It is probable that the rail shipments which now reach the eastern seaboard will later come largely by water and in increasing quantities.

The new Canal route should open up a new export field for western lumber, especially in eastern South America and in Europe—regions which largely have been dominated by yellow pine. However, western lumbermen will find progress slow in both of these sections, because of the old established business connections of the manufacturers of eastern woods. Yellow pine has been an important factor in many European markets for years and has held its own in competition with lumber from Russia, Sweden and Norway, and since the Douglas fir lumber must pay for a haul several thousand miles longer than yellow pine the cost of placing it on the market will be greater. The European markets, especially in the United Kingdom, are exceedingly conservative. Some fir is now used there and the demand for large ship timbers will probably rapidly increase, but a strong campaign would be necessary before the consumer of construction and finishing lumber could be persuaded to buy readily a wood with which they are not thoroughly familiar.

The South American trade of greatest

BOOM OF LOGS AND SAWMILL AT DOUGLAS, ALASKA.
THE DEEP FIORD-LIKE "CANALS" OF THE ALASKAN COAST OFFER EXCEPTIONAL OPPORTUNITIES FOR RAFTING LOGS AND FOR LOADING THEM FROM THE WHARVES TO OCEAN-GOING VESSELS.

importance to the yellow pine manufacturers is in the Argentine Republic where there is a very large demand. Southern shippers are familair with the needs of this market and would offer resistance to any incursions in their selling territory.

The West Coast of South America will probably always remain largely in the hands of the western lumber producers owing to their proximity . The cheaper freight rate, coupled with the fact that fir lumber usually sells at a lower f.o.b. mill price will largely discourage yellow pine men from seeking to develop a market in that part of the world. The same is true also of the Asiatic markets whose demands for our lumber have not increased greatly during the last decade. It is more than probable that outside of the lumber shipped there from the west coast that the chief supplies will be drawn from Japan, Formosa and Siberia, all close at hand.

It is not to be expected that the opening of the Panama Canal will either be a panacea for all of the troubles of the Coast lumbermen or the means of giving the people of the eastern part of the United States cheaper lumber, since it will take some years to build up a trade in western lumber and to develop shipping and terminal facilities so that the movement of large quantities of fir lumber will be possible. In the meantime the advancing price of stumpage and the reduction in the annual output of southern yellow pine, its greatest competitor, will have reduced competition and the territory now controlled by the pine manufacturers will gradually be absorbed by the Coast manufacturers without any marked reduction in lumber prices—probably at an increased price. We need not expect cheaper lumber on the eastern seaboard because of the opening of the Canal but we may reasonably hope to have a more gradual increase in lumber values than we would be warranted in expecting if the products of the great forests of the West were not to be made available to us at a transportation cost much lower than now prevails.

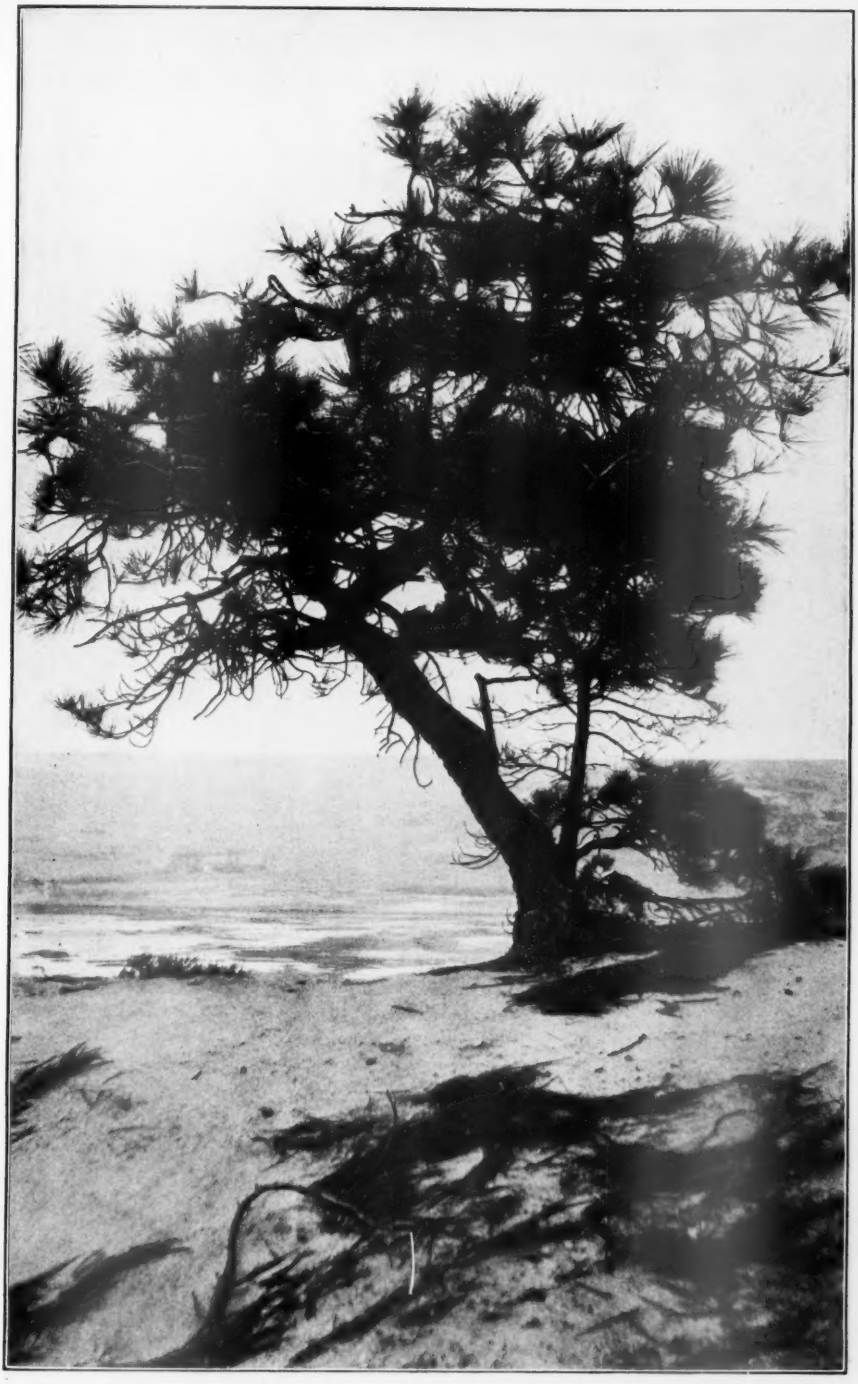
THE TORREY PINE

By ELOISE ROORBACH

CALIFORNIA is distinguished forestrally, for the frequency of what the botanists call Arboreal Islands—localities pre-empted by a single species of tree, surrounded by a distinctly different flora. Groups of trees of an entirely local character dot the flora of the state as an ocean is dotted with islands. Some of these tree islands occur inland, of which the Sequoia Gigantia (or Washingtonia) is a notable example. But the greater number are strictly littoral. The Monterey Pine is a fine illustration of such an island, being the dominant tree of the Monterey Peninsula and confined exclusively to this very limited area. Monterey and Gowan cypress, Bishops and Knob-cone pine, Santa Lucia fir, Catalina Ironwood and the Torrey pine (Pinus Torreyana) form other conspicuous examples.

The Torrey pine is restricted to a small tract at the mouth of the Soledad River, just within the northerly limit of San Diego's extensive city limits, and to a few on the Santa Rosa Island, which is one of the Santa Barbara group. These are its only known stations. The San Diego island contains a roughly estimated two thousand of these isolated survivors of an ancient forest that are making a last brave fight for racial continuance. Upon an arid cliff, overlooking the salt marshes of the river, buffeted by swiftly driving winds from the sea, they stand at bay. Some cling pluckily, with long bark covered roots, to the steep walls of sandstone knowls. Some have heavily buttressed their precariously leaning trunks, bracing against the inevitable as wrestlers thrust out a foot when, resisting an antagonist. Some, foiled by the winds, of their natural endeavor to reach, tall and straight to the skies, sweep the earth with prostrate crown—their reverent genuflection to a higher power. Some are recumbent, creeping along the ground as vines creep, dragging full ripened cones through the rifts of sand. A few boldly toss their stifly contorted branches into the air from the top of a cliff, staunchly braving the

A HARDY, AUDACIOUS TORREY PINE CLINGING PARALLEL WITH THE STEEP SLOPES.
Photo by E. Roorbach.



JAPANESQUE GROWTH OF A PINE UPON A SANDY KNOLL OVERLOOKING THE SOLEDAD RIVER VALLEY.
Photo by E. Roorbach.

storms, doggedly submitting to the roughly modeling gales. Some grow close to the bluffs for protection and are in consequence often washed with their helpless protectors, far down a crevasses, where they may be seen clinging desperately to any possible foothold. Every tree has been shaped by the influence of the ocean winds into a beautiful individuality of form. No two are alike, each developing a distinctive manner of resisting adverse conditions. Occasionally a branch that has made a bold, straight thrust into the wind has abruptly retreated, bending back upon itself with serpentine grace. Or a determined branch has been forced to yield inch by inch, until it re-curves downward, banyan fashion, and its needles become burried in the sand.

This San Diego island of Torrey pines, being the more accessible and by far the largest, is the goal of many a distinguished botanist, scientist, dendrologist as well as laymen interested only in its very remarkable beauty and wild charm of setting. This rare tree was discovered by Dr. C. C. Parry when on the Mexican Boundary Survey of 1850 and by Prof. John Le Conte. It was named in honor of Dr. John Torrey a distinguished scientist and botanist, by his friend Dr. Parry. Reports of an earlier discovery is exant but it is unreliable and the pine was not classified.

Dr. Jepson, author of the "Silva of California" gives a most interesting account of the formation of these arborial islands. He says "The arborial islands along the coast are taken to be remnants of a great Pleistocene forest. At the end of the Pliocene period there was inaugurated a tremendous series of earth movement on the California coast. Geologists are by no means agreed as to the period and duration of these oscillations but in the Tertiary and Quarternary there was at intervals, land connection between the present mainland and the Santa Barbara Islands. A moister climate in the Pliocene or Pleistocene periods would permit the existence of a great forest along the California coast and its extension downward over a large area which now rests beneath the Pacific ocean, save for the immersed peaks of the Santa Barbara Islands. Subsidence of the mountains

A Torrey Pine.
Drawn by E. Roorbach

COMPANIONS.

Drawn by E. Roorbach.

South Coast Range area left only vestiges of this forest on the immersed peaks or islands. Between these islands the tides flowed through the waterways of Pacheco Pass, Ponoche Pass, Warthan Pass etc., connecting the ocean and the inland sea of the Great Valley. The final uplift of the Coast Ranges, with the species following the receeding shore downwards, accompanied by changes and diversifications in climatic conditions would account for the persistence and isolation of the present arborial islands of Monterey pine, Monterey Cypress and other species along the California coast line. Subsidence and uplift would also explain the presence of species on the Santa Barbara Islands and not on others by reason of the difference of altitude among the islands."

Darwins oft-quoted statement that "The Oaks have driven the Pines to the sands." comes to mind when seeing this remarkable, interesting company of pines. They have, like wise fighters, entrenched themselves from further invasion by retreating to a territory so bleak and forbiding, no foe would care to enter within its borders. Their arid reservation is only about a mile wide and eight miles long. To the north Del Mar can be seen through their cone fringed branches. To the south, La Jolla lies, framed by strangely twisted trees. To the east, the Los Penasquitos and McGonigle canons lead the vision far on to the deeply colored, purple and amethist Cuyamaca mountains. The outlook is wild, barbaric in color as is characteristic of southern California's mesa lands.

The rains have poured heavily upon this pine encampment, as it has a way of doing in semi-arid districts and washed deep ravines toward the river and cut sharp angular paths to the sea. Some of the fissures are one hundred and fifty feet or more in depth, somewhat rounding, imitating in soft sandstone miniatures, the granite formations of Yosemite. In other places sheer walls have been gashed from flat table lands with a formation reminding forcefully of the Grand Canon. Sulphur and iron out-croppings have streaked these deeply eroded walls with yellows, reds, blues and grays. When the sky is blue and the sun shines brightly upon these mineral painted fissures topped with yellow sands, the spot rivals the famously gorgeous painted desert colorings of Arizona.

The surf that continuously dashes the soft cliffs, have occasionally claimed whole points, leaving jagged, raw looking scars in the steep banks. Mesambryamtheum, coarse grasses, opuntias, obtain a footing in the cracks of these bare walls with daring flashed of color. The trees lean away from these treacherous shores with dramatic vigor, quite as if in rushing flight from an enemy. They rush up narrow defiles, huddle together in canons, ambushing themselves behind jutting cliffs. A few lie flat upon the headlands, as if scouting, Indian fashion. The whole impression of the place where these stunted trees exist as best they may, is as if danger lurked everywhere and storm and destruction were ever immanent. The form of the trees, the gashed lands; the savage, brilliant colors, combine in making a spot of wild beauty as well as one of exceptional scientific interest.

Under cultivation in inland parks and gardens the trees grow symetrically. They are straight of trunk, full of crown and much taller, with outward swinging branches of greater length and of softer curve. Here in the unprotected land of their retreat, adverse conditions have made them short, compact, tough. Their branches are held close to the trunk, the crown is small. They rarely exceed a height of thirty five feet or a diameter of fourteen inches. The bark of the older trees is of a redish brown color, about an inch in thickness, composed of wide flat scales broken into

ITS GROTESQUE ARMS STRETCHING TO THE FAR, FAR WEST.
Drawn by E. Roorbach.

THE SCATTERED GROWTH ALONG THE ROADWAY.
Drawn by E. Roorbach.

deep, irregular ridges. The bark of the young trees is grayer and quite spongy. The wood is brittle and wide grained. The needles tough, unusually long, being from eight to twelve inches in length and in fascicles of five. They are dark grayish green, clustered in heavy looking bunches at the end of thick, knotty branches. The cones are triangularly oval, about four to five and one half inches in length, strongly attached to the branch by short, thick stems. They ripen in the early fall of the third year but persist upon the tree for four or five years. Cones of all ages of growth hang upon the tree at the same time. The seeds are dark brown with yellowish streaks and are ranked with the Digger and Big Cone pine, the Parry and One-leaf Pinon in food value. The seeds often remain within the cone several years after it has fallen to the ground.

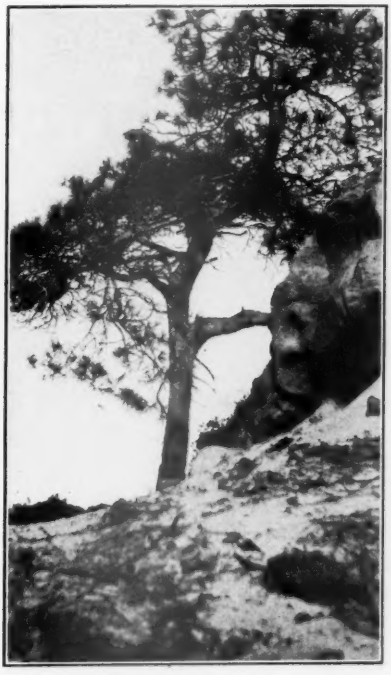
The Torrey pine, in order to counteract excessively adverse conditions, are prolific bearers. The cones are dark brown with an upward turning spike on the end of each scale. The scales do not readily release the seeds while on the trees but wait for the winds to send them rolling down to the pockets of earth. Unless the seeds are washed into crevasses of the earth that are filled with mineral soil, they are not apt to germinate. So the tree spreads slowly, but now that this tract of land is under the care and direct supervision of a city forester, a new and hopeful growth is gaining a footing. This pine is thought to be short lived, barely reaching to a hundred years of age, as far as can be determined. Yet the strange feature of this island of pines is that there are no dead stumps to be seen and no scars in the ground from which they

SHOWING THE STUNTED GROWTH OF THE TORREY PINE UPON THE RIDGES.
Photo by E. Roorbach.

might have been removed. It is supposed that the Indians carried away the fallen logs for fire wood and that the sands burried the scars made by digging for each bit of root. The tree flowers in February and March, the pollen bearing blossoms being large, terete, light brown in color and clustered thickly at the ends of the branches.

These pines are being companioned by many small shrubs and flowers which have crept in from the surrounding mesa for protection. Wherever shrubs grow, the birds congregate. So Torrey Island is developing into a most interesting resort of bird, flower and shrub. Its plant life is of unusual interest for the local species of beach and mesa have

SHOWING THE ARID BLUFFS AMONG WHICH THE TORREY PINES ARE LIVING.
Photo by E. Roorbach.

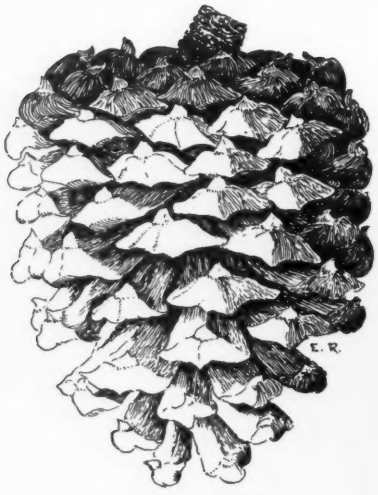


PROTECTED FROM THE WINDS BY SANDSTONE BLUFFS THE TORREY PINE GROWS TO ITS FULLEST HEIGHT.
Photo by E. Roorbach.

UNUSUALLY TALL AND SYMMETRICAL TORREY PINES GROWING IN THE LEE OF A CLIFF.
Photo by E. Roorbach.

been augmented by many an immigrant from distant habitats which find the needle-covered sand and the shade of the trees quite to their liking. Fortunately the state has become interested in this scientifically valuable group so these kindly protectors of shrubs will not be crushed out by too vigorous upstarts. Pine and Oak insurgent history will not be repeated on this refuge island. The shrubs are now of real benefit to the trees by shielding the seedlings from the winds and by conserving the moisture to a great extent. Ceonothus fills the canons with fragrance in the spring. Toyon makes it gay in the winter. Mahogany, sumac, laurel, manzanita add their flower beauty. Yerba Santa and several sages join the buckthorn and chaparal. The tree poppies dapples the sand with petals of gold. Clematis trails long green vines over brown needles and hangs white blossoms far down dark ravines. Nemophilia and gillia drift daintilly over sheltered slopes. Mesambryamtheums' succulent foliage clings in many a sandy sift. Lilac sand-verbena runs gaily among tall clumps of blossoming grasses. Maraposas stand poised gracefully above opuntias barbed leaves. The Spanish bayonet rears its thousand-tapered candelabra above velvety lichened rocks. Ferns thrive a brief season under their lea.

San Diego, thanks to the generous policy of the early days, includes 47,000 acres of land within its city limits. At the present phenominal rate of growth, there actually seems to be danger of its outgrowing its tremendously large grant of land—deeded to it in the days of its infancy. This little grove of rare trees has been reserved as a permanent city park—a wild, lovely park, always to



A Torrey Pine Cone.
Drawn by E. Roorbach.

The Roots, in Search of Moisture, Sometimes Drive Away the Cliffs but the Tree Holds in Mysterious Way to the Poor Soil, and Succeeds in Ripening its Cones.
Photo by E. Roorbach.

be kept inviolate. To be carefully preserved from civiliaztion ruthless advance. To be left unhindered of its own charming, spontaneous way. No close cropped shrubs, no stiffly bordered paths, no star and anchor beds of exotic hot-house aliens will ever disfigure its natural beauty. There is a city forester in charge who sees to it that they are let most gloriously alone, that thoughtless folk do not chop them into firewood, nor curio hunters carry away their patiently ripened cones. But nature will continue to train the vines, the winds to prune the trees, the flowers to congregate in informal tangles according to their own delightful vagaries. This little wild park sheltering the last remnants of a vanishing race, is an immense asset to the city of San Diego and is a living monument to the far-seeing city authorities who have legislated it into permanent safety. It is beyond the despoiling reach of investors and promotors. It will never be subdivided into home lots or leased to factory sites. Everyone in America interested in the conservation of our rapidly vanishing wild places must rejoice to know of San Diego's considerate care of this accessible, beautiful wilderness of untouched growth.

A rancher has applied for the rental of 320 acres on the Pike national forest, Colorado, to be used in connection with other private land, for raising elk as a commercial venture.

The Government has just sold 43,000 cords of cedar wood for shingles from the Washington national forest. The shingles manufactured from this wood, laid six inches to the weather, would cover 2½ square miles of roof.

The navy department has asked the forest service to investigate guijo, a Philippine wood, for possible use in decking boats and ships. Longleaf pine, sugar maple, and beech are the domestic woods most used for decks.

FORESTRY ON THE COUNTRY ESTATE

By WARREN H. MILLER

PART II. THE STONY PASTURE

AS I said before, forestry is nothing if not practical. If you know from the farm records that the pasturage yield from your stony acreage does not exceed from one to two dollars per acre per year, rest assured that you will do better, far better, with a well-managed forest on the land. (This statement applies in general to all stony and brambly pasturage, relics of the Glacial Age, clear across the United States). The trend of modern dairying is all in the direction of rich pasturage cut and carried to the stock, and land that must be hand-cut, ruinous or impossible to machinery, is better in trees.

Suppose then that you have decided that a certain ten acres will pay you best in forest. The first question will then be what species to plant; and immediately the three factors of climate, soil and rainfall require your careful consideration. Your first and most reliable guide will be Nature herself. What trees is she growing now in your woodlot? Which are evidently the survival of the fittest? In judging this question do not overlook man's interference in the processes of nature. The chances are your woodlot has been logged long ago, of its white pine and the ancient stumps will be discovered, buried here and there in the leaf mold. Years ago the lordly white pine, the noblest of eastern conifers, stretched in unbroken forests from Maine to the Western prairies and as far south as our coastal sandy plains, the home of the yellow pines. In Southern Jersey you will find it mixed with shortleaf, pitch pine, red oak and white oak on the rich sandy loams that extend down from the limestone ribs of the State. It thrives equally well on the slates of Pennsyl-

THE STURDY EVERGREENS STAND ERECT AGAINST THE SNOWS.

RED PINE, PLANTED SEVEN YEARS AGO ON A TWENTY-FIVE ACRE TRACT.

vania, the granitic bases of New York and Maine, and the Champlain gravels of the Lake States. Given the one requirement of moisture it is hard to find a soil that will *not* grow white pine. It will not however succeed in arid, non-nutritive soils that will not hold, in a reasonable fashion, the seasons's rainfall. The red and pitch pines are better for such. Nor will it stand overmuch heat. South of Masons and Dixon's line, except in the mountains, it would be foolish to try it. Commercially genuine white pine, *pinus strobus*, stands at the top of our construction woods, selling for $100 a thousand board feet in the lumber yard.

In cold Northern places such as the New England States, Northern New York and the Northern border of the Lake States, I would try spruce for my planted forest. The market for it is much more nearly to hand than with white pine, as the paper pulp mills are always hungry and the stumpage of spruce is steadily rising, having doubled in the last ten years. You can sell everything that you raise, including the thinnings, and all the timber in the tree down to the four-inch cull of the top. As to what spruce to plant you will find yourself in a beautiful quandary just as soon as you get well into the subject. We have in the East the the beautiful Canadian white spruce, hardly of large enough growth to be a commercial species; its sturdy brother, the Adirondack red spruce; and its swampy cousin, the black spruce. Then there is the familiar, imported Norway spruce, to which most of our big paper companies are pinning their faith. I do not like it; it's an exotic and a foreigner and I have seldom seen one in a windbreak or anywhere else in America that grew over 60 feet high before it began to peter out. Our climate does not agree with them. I can show you Norway spruces in the forest of Gilley in France that are 150 feet high and three feet in diameter: I have been through dozens of spruce forests in Thuringia and Saxony and have stood on the edges of ravines with Norway spruces two hundred feet high rising sheer up to me from the bottom-most depths of the

100 YEAR FIRS IN THE VOSGES, FRANCE

A Fir forest in the Vosges planted by school children. The ground cost originally 100 francs a hectare. At 60 years the firs were worth 5,000 francs per hectare. Today they are valued at 14,000 francs or $1,500 an acre

PLANTATION OF SCOTCH PINE, SIX YEARS OLD, NEAR LAKE PLACID, NEW YORK.

ravine. The Norway spruce cannot be made to grow like that here, except in nurseries and arboretums—not in the rough-and-tumble of a stand of growing forest.

Our own red spruce will. There are lots of them in favorable localities in the Adirondacks, reaching 3 feet in diameter—and every place in a well managed forest is a "favorable locality." The red spruce is a slower grower than the Norway and as the pulp men are after quick results they plant Norway and cut at 12 inches diameter growth. At least that is their present intention. They will eventually realize, as the European foresters have, that during those years *after* the twelve inch diameter, during the prime of its life, the tree puts on a far greater volume of wood per year, and that it is better to wait an extra twenty years thereby more than doubling the volumetric yield. 'Tis then that they will wish they had planted the tree that Nature has fitted to do that very thing, our own Adirondack red spruce.

And, let me caution against attempting any experiments with the various Pacific Coast spruces, the magnificent Engleman Spruce and the Douglas Fir (which tree, in reality, is a hemlock). While they have all been successfully raised in arboretums, they are entirely unsuited to our climate, and practically all the plantings that our state forest services have attempted with them have been complete or partial failures. The Western pine alone seems to thrive equally well here in the East, and to them may be added Parry's blue spruce, which is hardy throughout the "peach belt." Do not however conceive the idea that if you plant a forest of blue spruce you will shortly have a collection of young specimens worth a dollar a tree. The beautiful light blue spruce which delights the eye on every suburban lawn is the so-called Koster's blue spruce and was got by grafting selected light blue shoots on Parry spruce roots. The seeds from it revert to the original stock, which has a dark, silvery, bluish tinge, except in the young spring shoots. The natural home of the Parry spruce is in the canyons of South-

WHITE PINE SEEDLINGS SET OUT FIVE YEARS AGO.

western Utah and Nevada where occasional "sports" show the desired light-blue coloration and from these the "Koster" stock was originated.

In poor, dry, sandy soils, such as are encountered here and there in New England and the Lake States, I should not advise either white pine or spruce. Time was when such ground was planted in imported Scotch (or sylvester) pine. We have since learned better. Time has shown that in our climate and soil the red pine will give finer and healthier trees, and will be just swinging into its prime when the sylvester begins to give up the struggle against the vicissitudes of our climate. The red pine, also called "Norway" pine, not after King Kaakon's country but named after that noble locality, the hamlet of Norway in Main, has the same climatic range as the white pine. It grows in company with it, taking whatever soil is too poor for the white. It will not thrive where long, hot summers and droughts are to be encountered, in general not much south of Northern Pennsylvania. South of that the much-maligned pitch pine can take it splace. This species is renowned for its thick leafy verdure, its fire-resisting capacities and its everlasting wood. As it fills a special niche in the woodworking industries you will always find a market for a small planted forest of it—and the bright green bushy trees are a joy forever to look at.

Having decided upon your species, the next problem will be where to get the trees and how to plant them. Paradoxical as it may seem the State nursery four-year "transplant" is the cheapest of all planting stock. Cheaper than seeding, seedlings, or transplanted forest stock. The four year state transplant costs $4.80 a thousand in white pine and $5.12 in Norway spruce. Two year old seedlings cost around two dollars a thousand but their percent of failure ranges 50 to 60% making the ultimate cost the same, to say nothing of the cost of replanting. As for seeding, either broadcast or in seed spots, by the time you have bought your seeds at around $1.50 a pound, prepared your ground, sown the seed and then thinned out the seedlings and rescued them from weeds your cost will run at least $10. an acre against $8. an acre for four year state transplants that are already four years ahead. In the state nurseries the seedlings are grown, 7,000 of them to a bed 4 ft. x 12 ft. and in their second year are transplanted six inches apart by twelve in the rows in the nursery fields. At the end of two more years they have grown to bushy little trees a foot high with compact, vigorous root growth. Planted in the open fields or on old burns or brush land their percent of

SCOTCH PINE AT BRETTON WOODS, N. H., PLANTED BY THE BRETTON WOODS CO.

failure is only three to five percent. They are so hardy that I have picked up New York State transplants at Saranac, pulled up with no more ceremony than one would devote to a head of lettuce, and then after carrying them down to my place in South Jersey, they laid firm hold on the soil and next hear had two feet of crown to show me. Granite base soil of New York, sandy loam of South Jersey, it was all grist to those lusty young white pines. A Scotch pine seedling taken at the same time only barely recovered from this treatment. The transplants come to you in April or May, upon application to the State forest service made sometime during the winter. They will arrive buried in wet sphaguum moss and you are to guard them above all things from drying out, for a sun-dried root is a dead root, nor all your penitence and tears will avail to lure it back to life again. If you are not ready to plant, heel them in a shallow trench on the planting site. Your planting gang will be in units of two men and should get in 600 plants a day. The hole man goes ahead with a mattock and lays bare a shallow hole with a single stroke of the mattock. He must have a good eye for alignment on the sighting poles, and either step his paces evenly or space his holes with a stick gauge. His mate follows with a pail full of transplants with their roots buried in muddy water. He plants the trees, surrounding the roots with the topsoil lifted by the mattock man finishing off with the base soil to discourage weeds. At the end of the row they move the sighting stakes and start back. On slopes and dry ground this will be all the planting labor expended, as Nature is kind in May and the young trees will not lack for showers and moisture. In rocky soil the mattock man will have harder going and may need a helper to dislodge boulders in his path or dynamite to destroy them.

If you run into swampy soil the trees will surely die of wet feet unless you use the mound planting method of Baron Manteuffel. The mattack man cuts two large crescents of sod, and the planter first builds a little mound of earth of the soil in the sod roots, plants the young tree with its roots in the mound and then covers the mound with the two crescents of sod, grass side in,

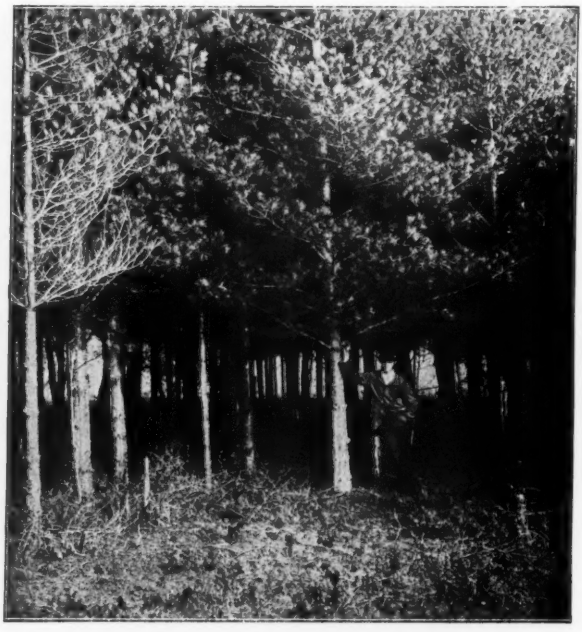



THE FOUR OPERATIONS IN PLANTING A SEEDLING.

the north crescent always overlapping the one on the south side. This makes a firm cone of plant food surrounding the tree roots, one that will not wash away by weathering. The Baron used it even on good dry soils, and claimed that, though more expensive than ordinary hole planting, it paid because of the quicker and sturdier growth of the trees—and his extensive forests at Colditz in Saxony (just above Meissen) go far to prove it.

Once having made your plantation you will not see anything very impressive at first. Little rows of dark green tufts that look as if they would never amount to anything. Along about the third year you will suddenly awake to the fact that you have here a potential forest for the trees are above your waist line. By the sixth year the leader shoots are taller than your head and by the twelfth year they will be thirteen feet high with trunks three inches in diameter and crowns of nine feet spread. In the twentieth year they will be six inches in diameter and twenty five feet high and you must then thin out and sell at least half of them. The rest will reach 8 inches in their thirtieth year and require another thinning; ten inches in the fortieth year and twelve in the fiftieth, with about two hundred trees to the acre. Such a tree will be about 60 feet high with a 24 ft. crown and they will stand on about 18 ft. centers. You can either cut them all and replant or thin still further, going up to 16, 18 and 24 inch diameter. It is good forestry to do this, for remember that each year the tree adds a quarter inch of wood all around the trunk and it means a lot of added volume per year in these larger diameters. In fact your total yield will double during the following twenty years.

In giving this brief sketch of the life of a planted forest, the reader will gather that it is not well to plant the entire forest at once. Far better is it to plant a few acres each year, making successive *sections* of even-aged stands. Your forest will then become an integral part of the estate and have its niche in the yearly claendar of farm operations. Each year there will be



PLANTATION OF WHITE PINE EIGHTEEN YEARS OLD.

planting to do, thinning on other sections and in due time a steady yearly yield of lumber to market.

I have confined this dissertation to conifers, partly because the lumber situation is steadily growing more acute with them, partly because State raised conifer transplants may be had in large quantities cheaply. And in case your state has no well equipped forest service there are at least a dozen large forestry concerns which are able to furnish you millions of transplants at prices equal to or lower than the State nursery charges.

A few more words as to forest arrangement: The spacing of the young trees has always been a matter for argument pro and con. In Germany it is very narrow, spruce, fir and sylvester pine being all planted on one meter spacing or even less. As they have a ready market for all the thinnings, poles, and faggots, the arrangement is a logical business outcome. But with us small thinnings are a source of embarrassment and a six-foot spacing gives the trees a change to reach fifteen years growth before a thinning becomes imperative. And they are best palnted in quincunx, that is with each alternate row staggered, the reason being that a tree taken out then gives the maximum growth space for the surrounding survivors. A thinning should be planned so as to leave the crowns of the surviving trees nearly touching, and always take out the suppressed and spindling trees so as to give the dominant sturdy specimens a chance to make their maximum growth. You will need fire and logging lanes between the sections. In laying out either, remember that the crown of any tree not crowded by neighbors will have a diameter in feet equal to three times its trunk diameter in inches. The trees bordering a fire lane come under this rule. A twelve year white pine with three inch trunk will then have a crown diameter of nine feet, that is, its longest branches will be four and one half feet long. Sections of this age should have a ten foot fire lane separating them wherefore the border transplants should be nineteen feet center to give you a ten foot fire lane must be widened to twenty-five feet, usually done by taking away the outside row of trees, first on one section and then on the other. In general these fire lanes should occur about four hundred feet apart throughout the forest.

(*To be continued.*)

The State university lands in Arizona are to be lumbered under a cooperative agreement between he Government and the State land commission. Arizona is the first State in the southwest and one of ew in the country to cut its timbered lands on forestry principles.

Makers of phonographs are aiming to use wood instead of metal in all parts of the instrument where this is possible, in order to increase the mellowness of the tone.

On the Pocatello forest, Idaho, 230,000 trees were planted during the past year, and almost half a million in the past three years, fully three-fourths of which are alive and doing well.

Experiments in the use of aspen for shingles show that the shingles do not check in seasoning, and that they turn water satisfactorily, but that they are too easily broken in handling.

There are somewhat more than 500 recognized tree species in the United States, of which about 100 are commercially important for timber. Of the 500 recognized species, 300 are represented in the Government's newly acquired Appalachian forests. All American species, except a very few subtropical ones on the Florida keys and in extreme southern Texas, are to be found in one or another of the national forests.

D. E. Lauderburn, a forest engineer, has withdrawn as a member of the firm of Vitale and Rothery of New York City, and is now engaged in the business of timber estimating and other branches of forest engineering at 56 Worth Street, New York City.

IMPROVEMENT IN RANGE CONDITIONS

By A. F. POTTER

Associate Forestor United States Forest Service

EIGHT years have passed since the Forest Service took charge of the National Forests and it seems opportune at this time to review what has been accomplished. Our job in the main is to protect this most valuable public property against destruction by natural agencies and to secure the widest possible utilization of the forest products under a plan which will preserve the permanent productiveness of the Forests. In other words, to preserve the forests and make them add most to the public welfare. Upon our success in this regard depends the permanence of the National Forests, because to secure and hold the support of the people we must manage their property in a manner which is generally satisfactory to them.

When the first National Forests, or Forest Reserves as they were then called, were created, it was with the idea only of keeping in government ownership lands having valuable stands of timber which should be held to meet the future needs of the people. No provision was made for even the utilization or sale of the mature timber until several years afterwards, and even then little thought was given to use of the other products and resources of the forests. While it was known that the lands were being used to some extent for the grazing of livestock, this was looked upon as only a temporary use which most likely would have to be discontinued before any extension of the forest or improvement in its condition could be secured. Therefore, the tendency was to restrict grazing very closely, particularly the grazing of sheep, and either prohibit it entirely or treat it as something which must ultimately be discontinued. This was practically the situation at the time the National Forests were transferred to the Department of Agriculture and came under the jurisdiction of the Forest Service.

FORAGE RESOURCES A VALUABLE ASSET

The outlook for the stockmen at that time was not a very bright one and naturally many felt that the maintenance of the National Forests was detrimental to their interests. It was realized in the beginning by the Forest Service that the forage resources of the National Forests represented a valuable asset upon which not only the welfare of the stockmen but that of a large proportion of the people was dependent, and it set about to work out a plan which would develop this resource and promote its use to the fullest extent consistent with good forest management.

The first thing to be done was to open up for use many areas from which stock had been excluded and to authorize grazing upon many areas which had previously been unused. The next was to substitute full use of all areas added to the Forests for the earlier policy of restriction. The result was that during the first three years, or from 1905 to 1907, the area of the average grazing unit was reduced about one-third, or in other words, the number of stock grazed upon the National Forests in proportion to the area of the range increased about 50 per cent.

BAD EFFECTS OF OVERGRAZING

Unfortunately, however, many of the areas which were added to the National Forests during this period had previously been badly overgrazed, and it was evident that a material reduction must be made in the number of stock grazed there before damage to the forest could be stopped, or before it would be possible to secure any improvement in the condition of the range. This made it necessary first of all to ascertain the extent to which the overcrowded con-

LARGE PARK IN WESTERN YELLOW PINE TYPE, SHOWING GRAZING POSSIBILITIES.

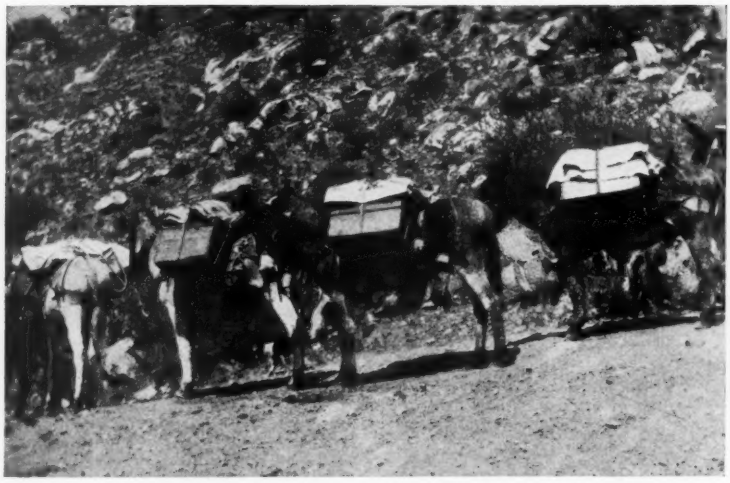
dition of these ranges could be relieved by the transfer of stock to other ranges and also to find out to what extent the damage could be checked by better management of the stock. A splendid opportunity was thus offered for constructive work which would be of real substantial benefit. It was a task not alone for the Forest Service, but also for the stockmen, and how well it has been done is shown by the results.

COOPERATION OF STOCKMEN INVITED.

Right in the beginning the Forest Service invited the cooperation of the stockmen and consulted with them regarding the practicability of the plans which were to be adopted. While it was not always possible to agree, there was generally a mutually advantageous settlement of all questions involved and most important of all, there grew up a feeling among the stockmen that the government desired to help bring about a more stable condition of their industry.

The greatest amount of damage on overgrazed ranges was due to the fact that prior to the inclusion of these lands within the National Forests there was no legal authority for their control. This usually meant that the feed belonged to the man who got his stock on the land first. There was no way, however, except physical force, by which he could hold the feed and prevent others from sharing in its use. Under this system numbers of stock largely in excess of the capacity of the lands were grazed upon them and with little thought or care except to get what there was while it lasted. It was natural that this condition should lead to serious controversy, and out of it grew many range wars which often resulted in great loss to life and property. These deplorable conditions have been removed on the lands which were included within the National Forests, for the simple reason that an authoritative means of control has been afforded under which right instead or might prevails. Had nothing else been accomplished, the removal of this one evil has made the work worth while.

As an orderly use of the range was being brought about, an effort was made to divide the range fairly between the different kinds of stock and the different owners. The stockmen were called together in meetings and so far as possible all questions were settled by mutual agreement, the government making arbitrary decisions only in cases where the stockmen could not agree among themselves or where it appeared



MOVING A CAMP OF GRAZING EXAMINERS IN ROUGH COUNTRY.

necessary to protect the public interests. Where it was clear that the ranges were being overgrazed and the surplus stock could not be taken care of by removal to other ranges, the necessary reductions were made gradually and so far as possible unnecessary loss and hardship were avoided.

RANGES GRAZED AT WRONG SEASONS

It was found that under the former system, or rather lack of system, many of the ranges had been used at unseasonable times and that this had resulted in the loss of much forage. An economical use of the forage plants and grasses can be secured only by a consideration of their natural habits, and it is just as disastrous to place stock upon a range before the forage crop has reached a sufficiently mature stage of development to be ready for grazing as it is to cut a field of hay or grain before the proper time. Accordingly grazing periods were established to fit the different districts and so far as possible to meet the needs of the stockmen, due consideration being given to the necessity for early grazing on lambing grounds and other special conditions. On many of the ranges the destruction of forage by trampling in driving the stock about in search of feed and by placing stock upon the range too early in the season while the feed was immature, amounted to fully 30 per cent of the crop. Under a systematic use of the ranges this loss was stopped and the formerly wasted feed utilized for the grazing of additional stock or for putting the stock in better condition of flesh. The result has been that in many cases the stockmen have been able to sell beef and mutton from ranges which before were only producing feeders and often poor ones at that.

FENCES RECOGNIZED AS NECESSARY

One of the greatest handicaps of the stockmen using the open public range for raising cattle and horses had been the prohibition of fencing, and efforts to handle their stock through this means had often resulted in prosecutions for violation of the fence laws. That the proper handling of cattle and horses requires the construction of fences in certain localities is recognized by all. Therefore, it was with much gratification that the stockmen learned of the willingness of the Forest Service not only to allow the fencing which was so much needed, but to cooperate with them in the construction of such improvements. This has reduced the losses from straying and theft, but most

MOVING A CAMP OF GRAZING EXAMINERS IN ACCESSIBLE AREAS.

important af all has enabled the stockmen to successfully raise higher grade stock and to get larger calf crops. The construction of fences has also been an important factor in preventing the spread of disease and reducing the losses from poisonous plants.

Early in the administration of the Forests it was found that pastures were needed for holding stock which was being gathered for transfer to other ranges or for shipment to market and provision was made to meet this need. The pasture privilege was afterwafd extended to include pastures for saddle horses and pure bred or graded stock and to give settlers a way of holding a limited amount of winter range adjacent to their ranches. This regulation has been taken advantage of very generally and the large number of pastures which have been built under it show in another way the advantages of a proper control in the use of the range.

DEVELOPMENT OF WATER FACILITIES

Next to grass the most important need of livestock is water. It was found that mush could be done in the way of improving the stock watering facilities on the National Forests and right in the beginning we started cleaning out the seeps and springs, piping the water into troughs, building reservoirs and doing whatever else might help to increase or secure a better use of the water supply. During 1912 a report was secured from each Forest, covering the water development work done since the Forests were put under administration. The figures secured show 676 water-development projects to the close of 1912. Of these, 173 were developed exclusively by the Forest Service, and as many more in cooperation with permittees; and 320 solely by the stockmen.

Complete figures are not available as to the new acreage of range brought into utilization by this water development. In Arizona and New Mexico alone, however, 65,000 acres of new range have been made available by water projects developed by the Forest Service in cooperation with the stockmen, and 420,000 acres made available by projects developed by permittees—a total of 485,000 acres of new range by water development in these two States alone. A great deal of water development done by the Forest Service has been to secure better management of range already in use, which accounts for the small acreage of new range brought into use by water development. While the acreage developed by the stockmen

is large, this improvement may be attributed almost wholly to the Forest Service putting the grazing on a substantial basis and assisting and encouraging permittees to develop water.

There is still a great possibility for improvement along this line. On the Pecos Forest there are 90,000 acres, which would carry 5,000 cattle or 20,000 sheep, now unused, due to the lack of water, and that could be largely developed by four dams costing $1,000 each. On the Tusayan Forest there are 200,000 acres not fully utilized which would carry 1,000 more cattle if properly watered. The Sundance Forest has 2,100 acres which were made available by developing four springs in 1913, and plans have been made for developing 20 springs in 1914. A great many of the Forests will show similar work in development accomplished and possible development in the future.

RESEEDING THE RANGE.

Let me now tell you something of what has been done in the way of reseeding the ranges. In 1907 experiments in seeding range to cultivated forage plants were initiated. To date something over 500 experiments, covering 86 Forests, have been initiated. From these tests it has been learned that artificial reseeding can be accomplished economically only on mountain meadow areas of good soil, and alluvial bottoms along creeks, at an altitude of not higher than within 500 to 1,000 feet of timber line; also that on these areas timothy is ordinarily the best species and that one year's protection from grazing is necessary after seeding.

The work under way on artificial reseeding this year and that planned, is to establish more definitely the economic possibility of improving our better soils by reseeding and possibly by irrigation. A number of observations and reports this year show that at a very small cost for diverting the water at the heads of meadows and scattering it out over the area, then seeding the area to timothy, the forage crop has been increased from 100 to 400 per cent, in many cases beyond the cost of the labor.

PROPER USE, BEST METHOD OF IMPROVEMENT.

This method of procedure, however, is both slow and expensive and the greater part of our range lands must be improved by protection and natural reseeding—at least within the next 20 years—until we know more about artificial reseeding. Our investigations have established beyond doubt that natural reseeding can be accomplished best by a rotation system of grazing, based upon the simple principle that after the vegetation has matured its seed, approximately from August 15 to September 15, grazing aids in scattering and planting seed. A report recently received from the Supervisor of the

A Mountain Meadow Surrounded by Dense Stand of Red Fir, and Watered by a Winding Brook.

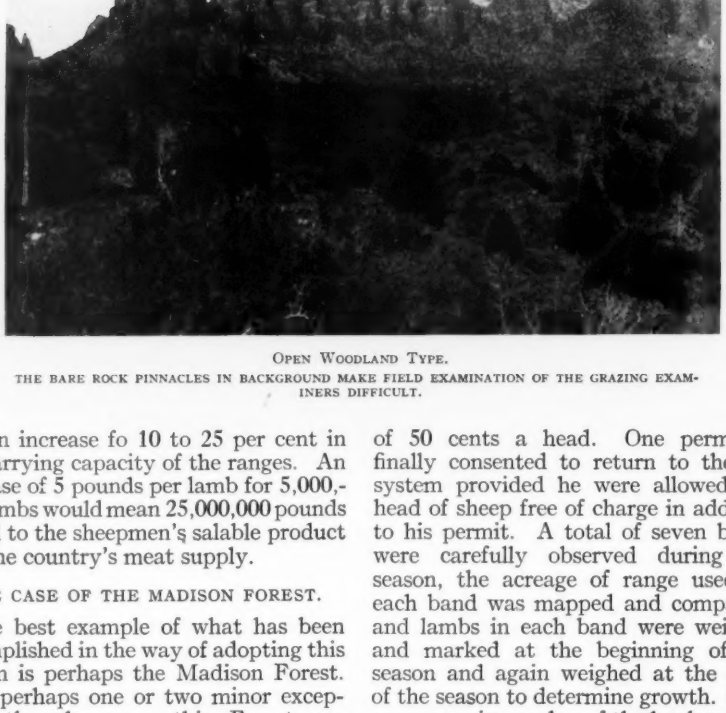
MANY DENUDED SLOPES OCCUR IN THE JEFFREY PINE TYPE, IN THE CENTRAL SIERRA NEVADAS.

Hayden Forest on the experiment started there in 1910 with one acre absolutely protected yearlong against grazing, 19 acres protected until after seed maturity and then grazed, and outside range unprotected, shows that the vegetation on the 19-acre tract grazed each fall is approximately 50 per cent better than the totally protected area and probably 200 per cent better than the range without protection. This means that the ranges can be improved faster in use than they can be in idleness. This principle is being rapidly adopted on many of the other Forests and is securing excellent results. In my estimation this system offers great encouragement in range improvement, for the reason that there is almost no waste of forage and consequently the stockmen suffer no loss in adopting it. It gives better results than total exclusion of the stock and it prevents the accumulation of coarse, unusable forage, and other inflamable material which is a menace to the Forests. This principle can be worked into the management of every piece of range on National Forests and will be fundamental as long as we have range management.

THE NEW OPEN SYSTEM OF HANDLING SHEEP

Our experimental work in methods of handling stock has been confined mainly to sheep. Byfar the most important phase of this work has been the development and practical application of what is known as the "Blanket system," "Bedding out system," or "New method" of handling sheep, which is simply open, quiet herding during the day and bedding the sheep where night overtakes them. We started a vigorous campaign for the adoption of this change in the handling of sheep in 1909, based largely upon the result of the Coyote-proof pasture experiments in the Wallowa National Forest, Oregon. At that time this method of necessity was largely employed in the Southwest and elsewhere by a few of the most successful sheep companies—such as Woods Livestock Company. Aside from these cases, most of the sheep were handled under a system of returning to the same bed ground as many times as the Forest Service would allow, which in a great many instances was more than the six nights provided by the Regulations.

At the present time there are a number of Forests where almost without exception the sheep are never returned to one bed ground more than one or two nights, and on nearly all the grazing Forests, at least a part of the sheepmen have been persuaded to adopt this method, and the result invariably is an average increase of about 5 pounds in the weight of the lambs, and I should



OPEN WOODLAND TYPE.
THE BARE ROCK PINNACLES IN BACKGROUND MAKE FIELD EXAMINATION OF THE GRAZING EXAMINERS DIFFICULT.

say an increase fo 10 to 25 per cent in the carrying capacity of the ranges. An increase of 5 pounds per lamb for 5,000,000 lambs would mean 25,000,000 pounds added to the sheepmen's salable product and the country's meat supply.

THE CASE OF THE MADISON FOREST.

The best example of what has been accomplished in the way of adopting this system is perhaps the Madison Forest. With perhaps one or two minor exceptions the sheep on this Forest are handled without returning to one camp more than two nights. In 1912 the Supervisor submitted figures and statements from sheepmen showing that the advantage of this method over the old method of returning to bed grounds was from 5 to 15 pounds difference in the lambs, with a corresponding difference in the condition of the ewes. Sheepmen established this advantage to be from 20 cents to 50 cents a head on the sheep. In 1913 we planned to get an experimental comparison of sheep handled under the new system and sheep handled under the old system on the Madison Forest. When the test came the Supervisor could not get any permittee to return to the old system for experimental purposes without paying a bonus of 50 cents a head. One permittee finally consented to return to the old system provided he were allowed 100 head of sheep free of charge in addition to his permit. A total of seven bands were carefully observed during the season, the acreage of range used by each band was mapped and compared, and lambs in each band were weighed and marked at the beginning of the season and again weighed at the close of the season to determine growth. The average gain per day of the lambs under the new system was .43 pounds as compared with .38 pounds made by lambs under the old system, a net gain of .05 per day per head in favor of the new system. At 5 cents a pound this difference amounted to 22½ cents per head for a period of 90 days. On a band of sheep containing 1,000 lambs, therefore, it would amount to $225 during the grazing season of 90 days; in addition the difference in condition of the lambs would probably result in a higher price for the better lambs raised under the new system.

This change in method of handling has been, in large part, responsible for the building up of the Madison Forest and enabling us to incresae the number of sheep grazed from 90,000 head to 107,-

DEEP CANYON SHOWING ROCKY CLIFFS.
AN IMPORTANT FACTOR IN INCREASING COSTS OF MOVING CAMP AND OF FIELD EXAMINATION BY THE GRAZING EXAMINERS.

000 head, with a possible further increase of several thousand head.

There has been some difficulty in getting the herders to adopt this new system for the reason that it means harder work, but experience has shown that after the sheep get used to the open system of herding they are no harder to handle than under the close herding system. All good herders take a pride in having their sheep look well and there is often the keenest kind of competition among them in getting their herd on to the best bedding ground. As such herders come to realize that it means better sheep they voluntarily adopt the open herding system out of pride in securing the best possible results.

OTHER INVESTIGATIONS.

The Forest Service is carrying on many other studies and experiments with a view to helping the stockmen secure a better utilization of the forage resources of the National Forests and to raise more and better stock. In 1911 a systematic range reconnaissance was begun to learn the exact proportion of the Forest land which was suitable for grazing and to find out the character of the different ranges; the kinds of grasses and plants growing in each locality; the kind of stock to which they were best adapted; and in fact, to get all of the information which would be of value in promoting the fullest possible use of the lands. Over 5,000,000 acres have already been covered by this survey. Aside from the actual acreage covered this work has accomplished something even greater by starting systematic, intelligent study and classification of the ranges on practically all of the grazing Forests. The result will be more equitable distribution of range between permittees, improvement in management of the stock, utilization of unused range and intelligent development of the range lands to their highest use. The success which we have had in all this work has been due largely to the hearty cooperation of the stockmen.

[American Forestry is indebted to the Forest Club Annual of the University of Nebraska for the cuts illustrating this article.]

WOODLOT FORESTRY

For the Instruction of Owners of Farms and Country Estates

By R. ROSENBLUTH, M. F.,

Director of Forest Investigations New York State Conservation Commission

THE woodlots of the farms and country estates have, for the most part, been treated with *mistreatment*.

Neglect and abuse have been the keynotes by which the owners have been guided in managing this valuable resource. Even the progressive farmers of the country who pride themselves on crop rotation, intensive methods, alertness and business on the rest of their farm, are following the old careless, if not ruinous, methods in their woodlots.

While the percentage of improved land on the farms has remained about the same from 1880 to the present, the amount of unimproved land has more than doubled and the woodlots have decreased about one-third—in other words, not only have the woodlots themselves deteriorated in condition, but a large area has been actually destroyed and made worthless, nonproductive land.

To point out the importance and value of the woodlots to the nation and the individual owners; to stimulate the owners to the practice of forestry in their woodlots, securing for themselves and to the nation the many benefits and great profits which well-managed woodlands yield; and to point out clearly and simply the principles and methods of correct forest practice—these are the aims of this bulletin.

IMPORTANCE OF WOODLOTS.

The woodlots of the nation represent, in the aggregate, an enormous source of natural wealth.

Statistic show that of the 1,903,289,600 acres net land area in this country, 878,798,325 acres are in farms. Of this farm area we find:

478,451,750 acres (54.4%) improved land.

190,865,553 acres (21.7%) woodlots.

209,481,022 acres (23.8%) unimproved land.

878,798,325 acres (100%) in farms.

Studies show a conservative estimate of the amount of unimproved land in farms, which is best suited to forest productions, to be at least 70,000,000 acres; which, in connection with the area now in woodland, makes a total of 261,000,000 acres, or 30 per cent of the land holdings in farms best adapted to forest growth. This total area is held in comparatively small holdings, on which all necessary work can be done by the permanent labor force at times when it cannot be otherwise profitably employed.

Conditions thus are ideal for intensive management of this great forest area.

At present it represents one of the least intelligently used assets of the nation.

The total value of the forest product of farms is $195,306,283, or roughly $1.00 per year per acre of farm woodlot.

Under intelligent and intensive management the owners should earn from these areas a fair share of the farm revenue, where now they produce almost nothing. This profit in money value should net about $500,000,000 a year and produce for the industries of the nation between seventy-five and eighty billion board feet of lumber each year.

To the owner, the value of this woodland is made up of many factors.

The most common products are lumber, poles, ties, fence posts and firewood. Besides these, many special uses may be had in different localities, such as pulpwood, implement wood, etc. There are also many special products which may be developed—thus, gathering seed of desirable species often will yield a good profit. The value of these products is sufficient, under good manage-

FORESTRY AND THE FARM

WELL-LOCATED WINDBREAKS FOR THE BUILDINGS, AND WOODLOTS ON THE HILLTOPS, WHERE THE SOIL IS POOR AND CULTIVATION DIFFICULT

TYPICAL WOODLOT

RESULT OF SUCCESSFUL CULLINGS OF THE BEST REMAINING TREES AT EACH CUTTING, AND GENERAL NEGLECT. OLD TREES OF INFERIOR GRADES, AND NO VALUABLE YOUNG GROWTH COMING IN.

ment and under average farm conditions, to provide a fair net return from the lands, and make the woodlot areas pay their fair share in the farm profits.

Unquestionably one of the biggest problems on the farms today is to secure and keep good help. This can generally only be done where year-around work is given; and the woodlot offers one of the most satisfactory solutions of the problems.

A belt of woods has proved of great value in protection against the direct mechanical effect of winds (blowing down of crops, especially fruit; shifting sands); against drying of soil; to a lesser extent in securing an even distribution of protective snow cover, and shelter after the snow has melted, for winter crops; and in very greatly increased comfort to people and stock. This spells increased profits in better and larger crops; and last, but not least, in greater comfort in the home.

It is a well-established principle now in successful farming, not to have "all the eggs in one basket." The wood crop is one which always has a market at a fair price; and with the price of the product constantly advancing. It can truly be called a winter crop, as the cultivation (improvement cuttings, planting, etc. can be done at times not required by any other crop.

The woodlot may be compared to a high class bond investment, and is better than such investment. Good sized thrifty material of desirable species is always marketable at a fair price, earning a fair ate (4 per cent. or more) of compound interest all the time by its growth in volume; in addition, it is growing in value, both through increasing prices of wood products, and because material from larger trees is more valuable than that from smaller trees. After some calamity, such as barns burning, or crop failure, it can then be utilized when most needed; or, for example, during a coal strike, when other sources of fuel cannot be had, except at exorbitant prices and with great inconvenience.

Nearly every farm has some land which cannot be profitably used for farming crops. This may be stony, rocky land, wet land which cannot be drained, pure sands, steep slopes, especially if subject to excessive erosion (washing away), etc. Frequently, be-

THE WOODLOT AS IT SHOULD BE

GROUND FULLY OCCUPIED BY THRIFTY, VALUABLE TREES. CUTTINGS MADE TO IMPROVE THE REMAINING STAND, AND TO SECURE A NEW STAND OF THE BEST KINDS. YOUNG GROWTH ALREADY STARTED

cause of irregularities in boundary lines, a considerable amount of land cannot be used without undue expense in extra fencing, etc. Again, many times, because of labor conditions, a piece of land which might otherwise be used for pasture or crops, is not needed, and could profitably be used for tree growth.

The aesthetic value is a factor which cannot be accurately measured in its value to a place. Certainly it is considerable. For example, on a country place the difference between attractive woods and scrubby worthless brush or waste places would be enough to make a great difference in the value attached to the whole place; and for purposes of sale, an attractive place could be disposed of very much more easily than an unattractive one. In fact, an attractive grove of trees might often be the determining factor in a sale.

Or, if one goes to buy a farm and sees a piece of poor brush land or waste land his estimate of the value of the whole place is mcuh lowered; if that same piece is covered with a well-set thrifty grove, even if young, his estimate of the value is raised.

PROTECTION TO WATER SUPPLY.

Around springs a piece of woods is one of the best means of providing against their drying up. In country places where a large and abundant supply of pure water is desired, the maintenance of woodland around the source of supply is a very valuable means of conserving it.

As a special problem, the value of woods on village, town and city watersheds is especially great. In such cases a considerable area of land must generally be held anyway to protect the purity of the water supply. This purpose can best be advanced by the maintenance of a good forest cover on the land, which will also prevent he silting up of the reservoirs, and irregularities in supply; at the same time yielding a profit from the use of the land.

There are still other uses which are hard to classify. Thus, it is well known that in keeping insect attacks on valuable farm crops under control, insectiverous birds, etc., are of great value. These always are able to thrive better when woodlots are at hand, in which to nest and seek shelter.

COSTS AND PROFITS.

In casting up accounts of the woodlot, it is seen that many factors, other than mere cash profits from the products derived, must be considered. At the same time, it is well to know just what financial return can be expected.

Unfortunately on this point there is lack of accurate data for the whole nation. The following examples will illustrate the possibilites:

In Western New York, a woodlot was heavily culled of most of its merchantable material in the past two years. There was left, however, about 202 valuable trees per acre on this portion, besides 146 trees which would best be removed to improve the stand. Most of the valuable species were hickory, white oak, red oak and white pine. At the rate of growth, as determined by measurements, and at average present market prices, in twenty years from now there would be value produced sufficient to earn the equivalent of a net annual income of $3.27 per acre at 5 per cent. compound interest; figured for forty years ahead, the net return would be $3.31 per acre per year, because of the more valuable material produced from larger trees.

This is disregarding the fact that at the end of these periods, timber prices are sure to be much higher than now, and also the fact that this stand is not fully stocked with valuable species.

An interesting and typical condition also presented here, in the possibilities of improvement of the stand, is that if the owner were to cut the 146 trees which ought to be removed, together with some wood material on the ground, he would secure about 3½ cords of wood, worth much more than the cost of planting a sufficient number of desirable trees, so as to secure a *full* stand of valuable species, and thus greatly increase the net profit per acre.

As another example, a farmer, realizing the value of his woodlot, has continuously improved it for the past twelve years, and today it is one of the most valuable parts of the farm. It has supplied fuel, fence posts, lumber for farm buildings and for repairs, and some has been sold. The work connected with its management was done in the winter and at odd times. The improved woods are now worth over $150 yer acre.

These examples are based on lumber sold under present market prices of stumpage or round logs. To the farm and country estate, the chief value of the woodlot is to supply lumber, posts and fuel, at least in times of ermergency. The purchase price of these materials is generally very much greater than is received for material sold; and used as a source of home supply, the woodlot would yield much greater financial profit than indicated above.

Again, it is worth while remembering that the direct value of products derived is but one of many benefits derived from the woodlot; and it is especially urged, in view of the common misconception of the subject, that the income from better management is *not* something which will be enjoyed only by our great grandchildren, who, as one wag said, "Never did anything for us;" but is constant, with financial returns comparable at least to those from a high-class bond investment.

WOODLOT HISTORY.

In the development of the woodlot, we must turn back and consider the conditions under which they developed. When the first settlers came here, hey found an almost unbroken wilderness. The forest had to be destroyed to clear land for agriculture. It had no value —in fact, it was considered an impediment. With that attitude, there was no effort made either to protect the forest from fire or other damage. Similarly, in the use of wood—at first only the very best trees of the best species would be taken for any purpose. With the gradual culling of the woods, we have today woodlots consisting mostly of culls or inferior stock. Most of the hardwoods are either the third or fourth set of sprouts from the same stump, and thus of very low vitality, or are seedlings of poorer species; the evergreens are, of course, of seedling stock, but the proportion of these is very much lowered, and these generally also are of weakened vitality. In addition, prac-

THE WOODS A WINTER CROP.

tically all the woodlots are damaged by fire, grazing, poor conditions for growth, often by insects or disease, so that today practically no woodlot is as thrifty as it should be. When the good farm land was cleared, then the poorer lands were attacked, and this continued, until today we find thousands of acres which, being best adapted to forest growth, should never have been cleared.

On the other hand, wet lands, a little difficult to handle becuase in need of draining, were mostly left uncleared, and frequently we find the best land on the farms under woods. Nor was any notice taken of the value of woods for windbreaks, etc.

So there is no fixed relation between the actual location of the woodlot and the location which would give the fullest possible benefits of an equal area of woodlot on the farm.

Now, all these conditions have changed. It is certain that intelligent and careful management of land, best adapted for the woodlot, will prove a profitable investment. This investment will generally consist of time and labor, which otherwise would be less profitably employed or else would lie idle (winter work); and in the foregoing of certain present cash returns when trees, which might be sold, are left to grow; and to a limited extent, in actual outlay of money, for trees to plant, in marking trees for cutting, or in other extra work in woodlot improvement.

A PROGRAM OF MANAGEMENT.

What is practical in forestry for the ordinary farm or estate in any given case must, of course, depend on the specific conditions involved. In general, the application of management will be in about this order:

(1.) Protection, principally against fire, often against grazing; and to a lessor extent, against diseases and insect attacks. Protection is closely connected with

(2.) Damage cuttings of watse material on the ground, dead or dying trees, etc., which make the worst fire traps, and breeding places for diseases. This, in nearly every case, can be done at a profit, as the material yielded will pay for the labor.

(3.) Avoiding Waste. In this connection may be mentioned the use of better and more careful methods in the woods:—cutting low stumps; working up all material in tops and limbs; working everything into its most profitable form; taking care not to injure remaining trees when cutting or hauling in the woods, etc. All this is closely connected with

(4.) Cuttings made of standing timber, in such a way as to improve conditions. While to be discussed more in detail under the subject of management, these are broadly divided into (1) improvement cuttings, in which the principal aim is the removal of those trees which should be cut for the benefit of the remaining stand; and (2) reproduction cuttings, in which the main idea is to secure a new crop from seed of the most desirable species.

(5.) Planting or sowing either on the open waste places; or in existing woodlots, where these are too open, or where they contain too great a proportion of inferior species; or for windbreak or aesthetic effects, etc. Planting is very closely related to the relocation or change in area of the woodlot, where necessary to secure the best results from a given area of woodlot—that is, where the sum total of all the factors of value, as enumerated previously, is the greatest.

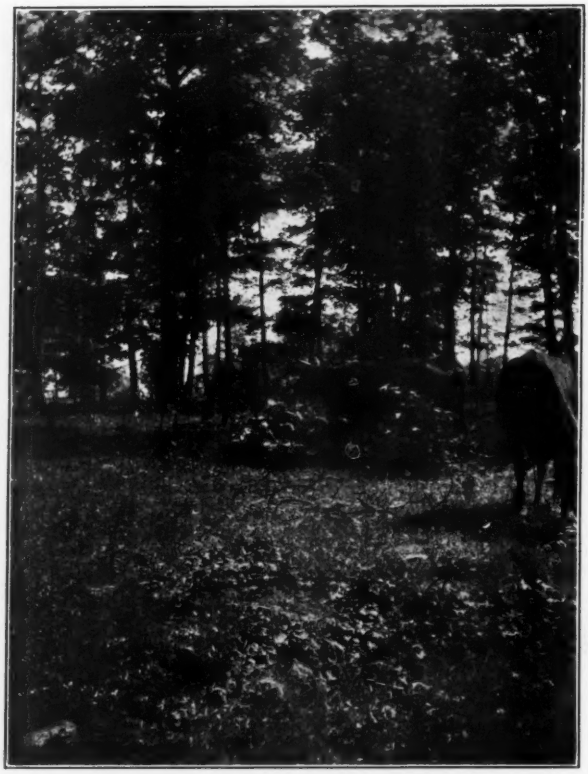
(6.) A plan of regulating the cut may be to secure a certain amount of material of given quality and size every year, or at regular periods. A plan for an equal annual cut is rarely practicable in ordinary woodlots, as now found, because the area under management is too small and its condition too poor. However, it is practicable to aim for an annual cut not to exceed the annual growth; or for a cut less than the annual growth, accumulating a reserve fund for larger timbers to be cut at more or less definite intervals. Where possible, this involves a definite system of forest management.

FACTORS OF GROWTH.

All tree growth, like other vegetation is governed by the environment in which found. This is true of individual trees, of species, and of types or com-

SECOND GROWTH OF WHITE PINE FROM WIND-SOWN SEED. TREES ARE TOO FAR APART TO SHED THEIR LOWER BRANCHES NATURALLY

Photo by A. Knechtel



HERE THE WOODLOT IS BEING USED FOR GRAZING—BUT THIS PREVENTS REPRODUCTION, THE COWS DESTROYING THE YOUNG TREES

munities. To be successful in forest management, the practice must conform to the conditions and full advantage must be taken of the factors of growth which control in any given situation.

These factors fall into two great groups, not however, clearly defined. These may be termed the "Natural" factors, including only the broad features closely related to climate, etc. over which man has but little control, and the "Subsequent" factors, brought about mainly by man himself, or through changes which he has wrought.

Briefly, the great natural factors of growth are: Moisture, heat, light, soil, slope, aspect and wind.

Moisture is a most important factor in tree growth. Without moisture trees cannot grow. But different trees differ widely in their demands for moisture, and only those trees adapted to the moisture conditions should be used in a given situation. For instance, the red pine can grow on very dry sites, while the black ash must have moist ones.

However, it is the minimum amount of moisture which any tree must have that is most important. Up to a rather high per cent. of moisture, such as in permanently soggy ground or in swamps, almost any tree can do better, the greater the amount of moisture it has.

Therefore, in forest management, it is important not only to use species adapted to the general moisture condition, but to use such practices as will conserve and improve the moisture factor.

As a genreal proposition, the woods

White Pine Grove—Saranac Lake Village. Long clean trunks due to density of stand

and waste lands of the farms are either the driest or the wettest ones.

On the dry situations, the best practice requires the keeping of a good forest cover, sufficiently dense to prevent drying out of the soil by sun and wind.

On the very wet situations, frequently much can be done to improve moisture conditions by a small amount of ditching which can now be done economically by the use of dynamite. Often, land which is called too wet and cold and now left to grow to worthless scrub, with proper drainage can be turned into the most fertile part of the farm. Again, there are opportunities on such land for special crops, such as basket willow. If left in ordiary woodland much can be done by laying special emphasis on selection of species best adapted to the particular site, perhaps supplemented by some simple ditching.

For each locality the relationship of trees to drought and soil moisture should be noted, and only those species used which are adaptible to the conditions of soil and air moisture prevailing over the area.

Heat is one of the chief factors in the distribution of trees. Thus, the forests of the north are of different species and types from those of the south. It is necessary to know the requirements of trees with respect to heat in order to determine whether they can be used or not. It is especially important to know the susceptibility of any given species to late and early frosts. Thus, the catalpa, widely heralded as a most valuable tree, is not adaptable over most of New York, being too frost-sensitive. Again, certain species, although they will be able to live under the lower temperatures and shorter seasons of Northern New York, or in the mountains, grow so slowly as to be undesirable, while in warmer districts their growth is rapid enough to make them valuable.

Beyond this choice of suitable species, we have little control over the factor of heat. The indirect effect of heat, such as the drying out of the soil, can be obviated, but this really is directly an effect of moisture conditions.

Minor influences of heat, such as sensitiveness to frost-cracks, can to a certain extent be controlled by regulating the density of the stand, etc.; in forest practice, trees which are especially susceptible to such injury should not be unduly exposed but maintained in more closed groups.

Light also is one of the major factors of growth. From a forestry standpoint, it is, with moisture, the most important, because these two are the ones most susceptible to control by forestry methods, and show the greatest difference in returns following proper methods in contrast to improper methods.

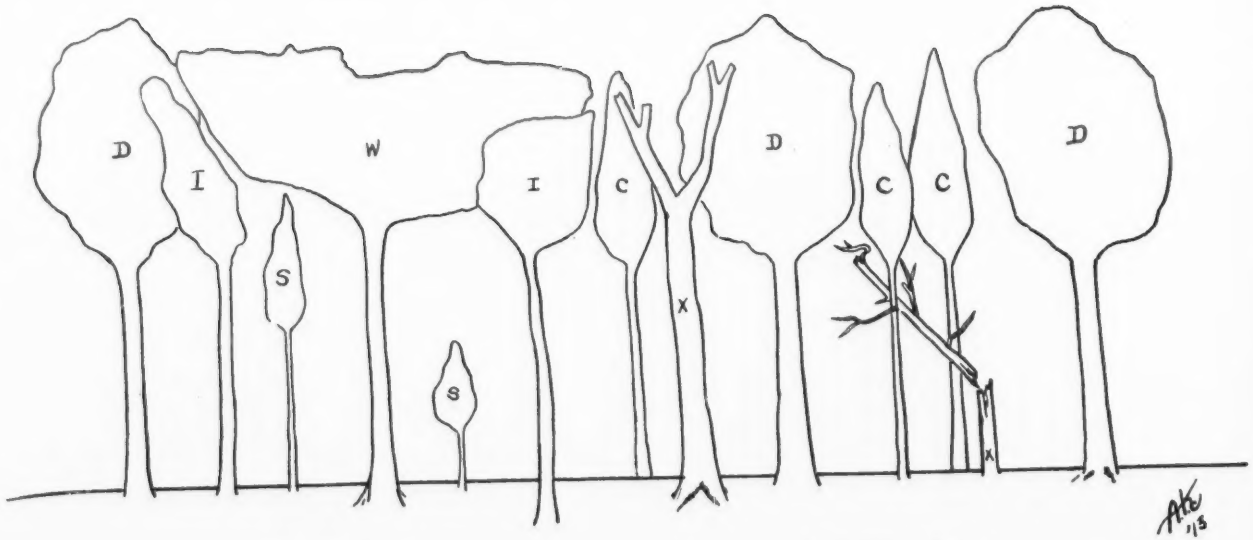
Light is absolutely essential to tree growth, as it is this that causes the inorganic plant foods taken from the soil and air to be assimilated by the leaves into higher forms, available for tree growth. Thus, one of the most noticeable facts in growth is the relation of any tree to the condition of light in which it can, and does grow.

Thus, a tree in the open may have its branches low and spreading; while the same species, grown in a dense forest, will have a long, straight clean trunk, with living branches only on the upper portions. This is true, becuase in the open, the total necessary leaf surface can be most easily obtained by spreading the branches laterally, while in the forest it becomes necessary to keep the crown well up with the rest, in order to get light for the leaves. At the same ime, the lower branches, deprived of light, die and eventually fall off, leaving the clean trunk of a forest tree.

In relation to the development and position of the crown or head, of a tree, that part from the lowest large living limb to the top, with respect to the stand in which it is found, a tree is divided into one of four classes:

(1.) Dominant, with full crown and sufficient growing room to the sides, as well as free light from above. When spreading, and shading much more land than it should, the tree is termed a "wolf tree."

(2.) Co-dominant: Trees just a little below the dominant trees in height, with free light from above but crowded from the sides; not entirely free, nor with full crowns.



W—Wolf Trees
D—Dominant Trees
C—Codominant Trees

I—Intermediate Trees
S—Suppressed Trees
X—Dead Trees

(3.) Inte mediate: Healthy trees, but far enough below the normal so as to be shaded from above as well as on the sides. Such trees are still thrifty, and usually capable of making full growth if given enough light.

(4.) Suppressed: Those so far behind and completely shaded that the crown development is not much more than enough to keep the tree alive. Such trees may, or may not, recover full vigor if given enough light, depending mostly on the species and the degree of suppression. As a rule, even if recovery is possible, it will be years before full vigor is regained.

A fifth class, of "dead" trees, is sometimes included.

Again, different kinds of trees differ very much in their demands for light. Spruce can stand a very large amount of shading, and does not do well in the open; while the Scotch pine demands a great amount of light, and can stand very little, if any, shading. Trees which can stand a considerable amount of shade are called tolerant, those that demand much light and cannot endure shade are called intolerant.

Also, individual t ees differ at different periods of their life with regard to their light relations. Most trees can stand at least a moderate degree of shade at the start, and generally demand an increasing amount of light as they grow older.

The demand for light also varies with the situation and district in which the tree is growing.

It is thus important to know the light requirements, not only of the different species, but also at different periods in the life of these species.

Proper forestry methods aim, as far as practicable, to assure enough light to the best individuals of the best species, so as to allow them to make their best growth, and at the same to maintain the stand dense enough to produce good, tall, clean trunks.

There is also an intimate relationship between light and maintenance of the quality of soil, and such features as the seed-bearing qualities of the tree.

As with moisture, so with light, a study must be made in each locality of the tolerance of shade by different species, and the forest management must be very largely based on the needs of the trees favored.

As with all other plant growth, the kind of soil affects very largely the kind of tree growth found on it, and the quality of that growth. Thus, the red pine can grow on the poorest of sands, while the basswood must have a rich soil.

Any tree will do better on a good soil than on a poor one. But we must not use a tree which requires a good soil on soil of inferior quality.

Just as in farming, good methods maintain and improve the qualities of a soil, while poor methods—the ordinary kind—impoverish the soil, so it is with forestry. The leaves and other decaying vegetable matter add very much to the richness of the soil, forming a good humus and leaf mold. But if exposed to too much light and heat, this humus does not form from the leaves and their nourishment is wasted. So one of the guides to proper forest practice is to maintain such a cover as will improve the soil conditions. This is generally accomplished by maintaining, as nearly as possible, a complete shade for the ground.

At times when reproduction by seed from standing trees is desired, however sufficient light must be given to do away with the litter, and thus provide better seed-bed conditions.

The requirements of trees with regard to soil must also be studied, and only those species used which are adapted to the quality of soil on the site on which grown.

The *Species* itself has much to do with the rate of growth. Certain species, as hemlock, or native red spruce, are naturally very slow growers, while others, as Carolina poplar, are naturally very rapid growers. Of course, all species will grow better on good soils than on poor ones; and under proper forestry methods will grow much better than under poor methods. At the same time, it is important, other things being equal, to favor the most rapid growing species. Thus, generally, red oak should be favored over white oak, as it

grows so much faster; while the native spruce and hemlock grow so slowly that it is not best to favor them in the ordinary woodlot.

Knowledge of the rate of growth is especially valuable in choosing trees for planting, as naturally slow growers would not produce enough to pay interest on the money invested.

While moisture, heat, light, and soil comprise the four great elements affecting growth, and the character of the species itself is very important, even in the same district, these factors are subject to many variations.

The steepness of the slope is an important factor, greatly modifying the factors of light and moisture.

The aspect (the direction in which the slope faces, as east or west) is important, in modifying especially the factors of heat and moisture, and to a certain extent, of light. Thus, a south slope, which becomes heated sooner in the spring, is very much more apt to have growth start earlier, and this growth is more likely to be "nipped" by a late frost, which is general over the whole district, than would be the case on a north slope. A south slope dries out more than a north one. And as between south and north slopes, so between west and east ones; and on a ridge running northwest to southeast, for instance, the northeast slopes might have very different conditions of growth than the southwest ones.

Wind is another factor, acting to a small degree in modifying the forms of trees, but much more important from its modification of the factor of moisture, and still more so in its mechanical effects, in blowing down trees.

In modifying the form of trees, this is apparent mostly on exposed mountain peaks, along the shore, etc., where a dwarfed, bushy form is developed, best to resist the winds.

To prevent drying out of soils, a dense border at the edge of the woods should be maintained.

Should the border of the woods be open, it will be best to plant several rows of such trees as Norway spruce to act as a windbreak.

The mechanical effect of wind—that is the blowing over of trees in the forest—is its most important one. The resistance of different species, as well as of individuals grown under different conditions, is a consideration of importance in management.

Species must be so selected and managed that the danger of windfall is reduced to a minimum. Thus, a species like the spruce with its shallow root system, must be grown in closer stands, and in more protected places than the deep-rooted Scotch pine. Especially in cuttings in dense stands, where resistance to wind was provided by the whole woods, trees must not be left to stand too openly, as the danger from being blown over by wind is too great. This applies especially to shallow-rooted species like spruce. With them different forest practice must be adopted than that used with wind firm species.

So far we have discussed mainly the natural factors of growth. But much more important, generally, in their damaging effects, are the factors produced by man himself or by conditions which he causes. To a certain extent, of course, these damaging agents are entirely "natural" in their work, and not the result of man's work.

Most important is fire. Almost all of our woods have been seriously affected by fire.

The effects of fire are many, and often but little understood or noticed. Thus, the ordinary, light ground fire, which is not thought of as doing damage, burns up the leaf-litter and vegetable mold, which is so valuable in soil fertility. From this alone, the loss is enough to warrant great care in excluding fire. Then, if there is any seedling reproduction on the ground, this is generally killed off, so that desirable new stock cannot get established.

If the fire is a bit more severe, enough injury is done to the standing trees to check growth, or at least weaken the vitality of the trees. Generally a wound is produced through which disease or insects can enter and thus kill or seriously affect the tree. Frequently the young saplings and small poles are killed outright, and thus only mature trees past their prime are left standing.

THE COMPARISON OF NATURAL REPRODUCTION ON PASTURED AND UNPASTURED LAND

TO THE RIGHT OF THE FENCE PASTURING HAS BEEN PROHIBITED, AND THERE IS AN EXCELLENT REPRODUCTION, WHILE ON THE LEFT PASTURING HAS BEEN PERMITTED AND NO YOUNG GROWTH IS TO BE FOUND

Photo by J. M. Stephen

EFFECTS OF LIGHT GROUND FIRE

These are generally injured so that their value is greatly decreased.

Last comes the fire severe enough to wipe out all the stand.

It is in one of four ways that fires do most of their damage in woodlot:

(1.) By burning up the litter and plant food, making the soil poorer.

(2.) By checking growth, and reducing vitality.

(3.) By injuring tree, so that either loss in quality of wood is effected; or wounds produced through which rot or insects can enter the tree.

(4.) By destroying new young growth, and generally of the best kinds. Thus, all evergreens seedlings may be wiped out, while the hardwoods, through their ability to produce sprouts, may survive; and the poorer species, as birch, increase at the expense of the better.

The principal causes of fire are railroads, brush burning, and carelessness. The question of protection from fire is discussed under Management. In general, however, different species differ considerably in their ability to withstand fire, and allowance for this should be made in the selection of species.

In woodlots it is the common practice to turn cattle or hogs into the woodlot to pasture. It is generally believed that this does no harm to the woodlot.

As a matter of fact, only in fairly mature woods does grazing do no damage; and in itself, the fact that there is any pasture there means that the woods are not in as good shape as they should be. If the woods were as dense as the best conditions demand, there would not be enough light on the ground to support a growth of grass, and the amount of pasture would not be sufficient to turn the cattle into the woods. Besides this, cattle browse off young trees and trample down others, and hogs root up many trees, while sheep are especially destructive to very young growth.

Only in special cases should the woods be pastured, such as turning in hogs to root up the ground just before the seed falls in a good seed year, thus making the seed bed conditions better.

As a general thing, a piece of land should be used *exclusively* either for woods or for pasture. Well managed for either use, the return will probably be greater than the combined use for both woods and pasture.

Each year the damage by forest

insects and tree diseases is becoming a more serious problem. Especially does the damage from these sources increase with trees weakened by fires, or grazing, or other causes, or in old over-mature trees.

Insects are divided into three classes as to mode of attack, namely, chewing, sucking and boring. From the forest standpoint for practical purposes, the two classes of borers and leaf feeders (chewing) are the most important.

The borers generally work by burrowing under the bark and feeding on the living "cambial" tissue between the wood and bark. Spreading out in secondary channels, these insects more or less girdle the tree, or parts of it, and either greatly weaken the vitality of the tree or kill it.

The leaf feeders, as their name indicates, injure the trees by more or less completely eating off the foliage, thus greatly checking growth and weakening the tree; and killing it if repeated over several years.

The insect enemies are so many, and so varied according to locality, that it is impossible to enumerate these here. Most states maintain entomologists from whom information concerning the insect pests of their states may be obtained.

Of the tree diseases not so much is known. Those that attack living trees generally work by feeding on the cambial layer just under the bark, and appropriating to themselves the nourishment which should go into the tree.

Many of these diseases have two stages and more than one form; that is, they may live part of their lives on a certain tree and part on another plant, and the form on the different hosts may be entirely different and not recognized except after careful study.

Thus, one of the most threatening diseases which has appeared in some time has been the white pine blister rust. This disease lives in one form or young white pine and at other times in another form on the currant and gooseberry. Fortunately, the disease has so far been kept in check by destroying all the currant and gooseberry bushes near any infected localities—deprived of its alternate host, the disease cannot spread.

The chestnut blight is perhaps the most virulent tree disease which has ever appeared. No known remedy has yet been found, and the destruction of the chestnut seems imminent.

The liability of certain species to damage from these causes must be understood. Thus, the chestnut bark disease is so virulent in its attack on chestnut as to render it impracticable to favor chestnut as a tree in forest management. Similarly, in many cases the white pine weevil, hickory borer, elm leaf beetle, locust borer, and other insects make inadvisable the favoring of those species in certain localities and under certain conditions.

These must necessarily modify the forest practice, both in selection of species and especially in taking steps to see that the woods are as little liable to attack as possible. This generally means keeping the woods cleared of dead and diseased individuals, as these are the breeding places for the disease or insect. Another important and practicable thing is to protect and encourage the propagation of our insectiverous birds, etc., as these are very valuable in checking depredations.

Poisonous gases, such as produced by smelter works, often will kill all the tree growth in their vicinity. This is of very limited occurence, however, and not often noted. About the only measure possible in such cases is to use the species most resistant to the poisons found.

(To be continued.)

WASTE LAND ON THE FARM

INITIATING A STATE FOREST POLICY IN KENTUCKY

By J. E. BARTON, *State Forester*

TO a man who undertakes the task of organizing a forest policy in any State, I feel certain a great many situations and circumstances which arise will come as a shock, especially if, heretofore, his earnest endeavors have been confined to private work, teaching or work in the federal Forest Service. There is a poem entitled, "In Kentucky," which contains these lines "Politics are the damdest in Kentucky," and the force of this statement with relation to the initiation of a forest policy in the State I have felt most keenly. By no means do I desire to give the impression that politics in Kentucky are worse or more in evidence than in any other State; but since I have been myself engaged in State work my observation here and elsewhere has been that the political exigencies of the State, the party, and the individual are the "form factor" of the situation as far as a State forest policy is concerned. An adequate preparation for the office of State Forester would involve, among other important features, a course in county politics and training for the diplomatic service. Then, if the receptive individual is long on suavity, patience and tact, he will probably hold his job through one administration and accomplish some effective work. The people of the South love politics and the Southerner is a born politician, which facts should be written in large letters in the mind of such persons as seek to initiate forest policies in the Southern States.

It is perfectly astonishing, when one considers the length of time during which there has been a concrete forest policy for the United States, the amount of literature that has been published in this country concerning forestry and conservation generally, the discussions, lectures and talks upon this subject that have been staged everywhere, what a wide-spread ignorance with regard to forestry there is, even among educated and well-informed people. It is against this stone wall of ignorance that a State Forester is continually butting his head and for that reason one of the chief features of any policy he may initiate must be educational exposition of what he is trying to accomplish. He must talk and write Forestry continually and must take advantage of every opportunity to arouse an interest in forestry and conservation problems. In this connection, I have undertaken lectures at Farmers Institutes and meetings of diverse character; wherever, in fact, the opportunity presented itself. I have taken the matter up through Women's Clubs, the Boy Scouts, and through the Educational Department of the State. A plan is now under way to organize Boys' and Girls' Forestry Clubs throughout the State on the same general lines as Boys' Corn Clubs and Girls' Canning Clubs are organized by the United States Department of Agriculture. It seems to me that the hope of forestry in the State and in the United States lies in an intelligent understanding of the problem by the rising generations and that through the children a sense of the importance of the problem will be brought into a large number, if not the majority, of the homes within the commonwealth and the nation.

Of course, a wide dissemination of literature on forestry is desirable and this should be as timely and helpful in a practical way as it can be made if it is to count for anything in enhancing the value of a forest policy for the State. For instance, it has been my observation that one of the important problems for Kentucky (certainly in the Blue Grass Section and Western Kentucky) is the raising of fence post material. An exhaustive study of the species which

RAFTS OF OAK, ETC., ON BEACH OF RIVER NEAR ASHLAND, BOYD COUNTY, KENTUCKY

are suitable for fence posts, the results of which are published, is timely, but so far as regards black locust (one of the species which could be used) no study is complete without giving the farmer definite and practical instructions with regard to the control of the insect enemies of the black locust, notably the locust borer. Again it is unusual and striking features that stick in the mind of the average citicen and I am attempting to make use of this fact in getting together an exhibit at the State Fair this year. The idea is to present something novel and out of the ordinary which will attract attention. In this connection it may be stated that a forestry exhibit (or for that matter any kind of an exhibit) which involves action is a great deal more of a success in riveting attention than an exhibit which suggests a museum. To put it in the language of the day, where there's something doing there you'll find the crowd and get attention, a fact which is made use of by the Salvation Army, among many notable examples.

As is usual in establishing any forest policy one of the first features of the work which has received attention has been the matter of fire protection. Since the appointment of the State Forester was made September 1, 1912, there was little opportunity to get any organization under way in the fall of 1912. An effort was made, however, to get together in usable form some information with regard to the extent and prevalence of fires and other essential information through the county officials. The result was exceedingly negative. In no one ca e was accurate information of value received. Early in the spring of 1913 the question of getting Kentucky into line under the Weeks Law was taken up. The proposition seemed simple enough and yet the matter was delayed from one cause

LOGS BEING HAULED TO RAILROAD
THE ONE ON THE WAGON IS WHITE OAK, 14 FEET BY 34 INCHES. IT SCALES 787 FEET SCRIBNERS RULE. THE SCENE IS NEAR KUTTAWA, LYON COUNTY, KENTUCKY

or other throughout the entire summer. In fact, it was the twenty-fourth of September before the Governor as Secretary of the State Board of Forestry signed the necessary agreements. With the cooperation of the Federal Government in fire protection in the State assured, it seems that a sound beginning of a fire protective policy has been made. This fall, two patrolmen at large for the State have been appointed and between twenty and twenty-five county patrolmen will be provided, such appointments being confined to those counties needing protection most. The details of this fire protective scheme have not as yet been fully worked out; but are in a fluid state. In connection with the plans for fire protection the active cooperation of the Fish and Game Commission through their wardens has been secured. Also the cooperation of timberland owners is a most desirable feature of the proposed plan, and in two quarters at least an organization of the interested individuals is probable.

There are no public lands in Kentucky of any sort, from which State forests could be created. Undoubtedly, the value of State forests, scientifically managed, as concrete examples of the practicability of a forest policy for the State can not be over estimated. At the present time it seems that the only way the necessary land can be acquired is by gift or purchase. The former method is uncertain and vague; and the latter method is out of the question except, perhaps, in a very small way at the present time because of the limited amount available under the appropriation for the State Baord of Forestry. Another way of obtaining the requisite land has been suggested, but does not seem feasible for a good many reasons; that is, turning tax-lands, suitable for the purpose of State forests, over to the State Board of Forestry. One of the principal objections to this is that the present squatters on the land would

TOOLS USED IN RIVING STAVES
HEATING AX, THROE BOLTING AX AND GAUGE ON "THE PONY" BLOCK. JACKSON COUNTY, KENTUCKY

constitute such an annoyance as to make the land untenable. Another difficulty is with regard to titles. The lands of the State, as a whole, are held in fee simple and, so far as Eastern Kentucky is concerned, are held by large companies, such as the coal companies. Eastern Kentucky is one vast coal field. It has impressed me in this connection that these companies are in excellent circumstances to practice scientific forestry with considerable profit to themselves and that here is a field which can be worked advantageously for the advancement of forestry in the State. The practice of scientific forestry has identical aims with the needs of coal operators; that is, a dependable timber supply over an indefinite period. Last year about 16½ million tons of coal were mined in Kentucky. The amount of wood used in mining a ton of coal is roughly estimated at 3½ feet board measure, so that this meant a wood consumption of over 57 million feet board measure. Certainly an important matter, especially in view of the fact that the coal fields of Kentucky have but recently been operated to any extent. Here then seems a place where efforts to promote a sentiment in favor of forestry and encourage the growth of a forest policy among private owners is likely to be most successful. In Eastern Kentucky, the Consolidation Coal Company has already employed a forester, and in the Western Kentucky field the St. Bernard Mining Company have made extensive experiments in forest planting.

In the meantime, with a view of encouraging the planting of forest trees in the State, two forest nurseries have been projected, one at Frankfort and one at Louisville. The nursery at Louisville is well under way. It includes twenty-five acres of ground which is a part of the land owned by the Kentucky State Fair. It is intended that the nursery shall form a permanent exhibit as a part of the State Fair and that a demonstration forest shall be established as a portion of the permanent exhibit. The stock from the

BRINGING GALAX OUT OF THE MOUNTAINS
MT. MITCHELL AREA, YANCEY COUNTY, NORTH CAROLINA

ADMINISTRATIVE SITE PURCHASED FROM MRS. A. T. CONNNALY. REPAIRED BY FOREST SERVICE, MT. MITCHELL AREA, YANCEY COUNTY, N. C.

nursery will be furnished to the people of the State either at cost or free, a matter which has not, as yet, been fully determined. The nursery at Frankfort will be on a slightly different footing. The land on which the nursery will be established is controlled by the trustees of the Kentucky Normal and industrial School for Colored Persons. In addition to raising stock for the use of the citizens of the State, an effort will be made to teach the negro students such nursery practice, planting and care of trees as will enable them to qualify as caretakers of grounds, trees and groves on private estates, since there is a real demand for this character of knowledge and no supply of intelligent labor from which to draw.

The work, then, in Kentucky is shaping up along some pretty well defined lines, as follows: (1) forest protection; (2) education; (3) forest extension, i. e., encouraging the planting of forest trees by supplying the material; (4) encouraging private owners to take up the scientific management of their tracts; (5) acquiring suitable tracts for State forests. It is expected that the work in the immediate future will develop largely in these directions. An effort will probably be made at the next session of the Legislature to secure a method of taxation favorable to the reforesting of suitable areas. Also it is expected that a law will be passed permitting the establishment of National Forests within the borders of the State. At any rate it now appears as if the forest policy for the State were on a sound footing.

AN EXHIBIT AT THE FOREST PRODUCTS EXPOSITION

AT its annual meeting on January 14 The American Forestry Association decided to have exhibits at the Forest Products Exposition to be held at Chicago April 30 to May 9 and at New York City May 21 to May 30.

According to advice received at the Chicago headquarters the exhibits of the lumber and allied associations alone will provide one of the most interesting and instructive displays ever arranged for an industrial exhibit in this country. It has practically been decided that the United States Forestry Service will display a number of most instructive incidentals to the service, including Fire tower, Equipment station, Timbersale models, Erosion models, Relief map, Mine timbers, Greenhouse benchboards, Collection of scientific instruments, National forest model, Wood utilization exhibit, Wood distillation exhibit, Paper pulp exhibit, Timber testing exhibit, Wood preservation exhibit, Specimens of wood waste products manufactured from such waste and Bromides, transparencies, maps and charts. It is understood that some of the State forestry divisions will make exhibits.

The war department is reforesting a large area near Fort Bayard, New Mexico, for use as an army hospital site.

The light house reservations on the great lakes are able to grow all the white cedar needed for spar buoys in their district.

The Kaibab and the Coconino national forests adjoin each other. Yet it takes from two to three days to go from one to the other across the Grand Canyon of the Colorado.

THE SPRAG INDUSTRY OF EASTERN PENNSYLVANIA

By JOHN L. STROBECK

Pennsylvania Department of Forestry

IN this day of proper realization of the limit to which Nature bestows her bounty, and of the consequent conservation movement, any action which tends toward the closer utilization of Nature's products is a boon to the conservationist. The fact that the fruits of the soil were exposed to the exploits of man in an unduly high-handed manner, and with the discussion and agitation attendant thereto, left the impression that anything below a par excellence quality comprised the waste in our industries. Especially is this true in the timber industry.

Business is a matter of dollars and cents, and sometimes, a few accessories thrown in. Where those dollars do not come to the surface, the business becomes defunct. In the matter of Forestry, no progress has been made with the practical man unless he is shown its results in figures. It is true that Forestry is applied in cases where other motives besides the desire to gain money value is concerned. Also, there are cases where it is practiced with no particular end in view, but a man who looks for his living comforts to come from his lumber industry will not install the practice of Forestry to his business if it does not pay any more readily than he will an unprofitable office device.

But the fact that timber is being utilized as closely, in the judgment of the operator, as is permitted from a financial standpoint must be admitted. However, in many cases, he lacks somewhat in judgment. In this particular it is the intention to discuss in this article an industry, though small in extent, yet serves the purpose to show the extent to which timber in certain localitits is utilized and how it may be extended to serve the purpose of closer utilization in other localities.

A sprag is a cylindrical piece of hardwood, twenty-one inches long and is pointed at both ends. Generally, specifications call for a thickness of from two and one-fourth to three and one-fourth inches. In certain mines, however, they require a somewhat more uniform size, namely three to three and one-quarter inch diameter.

Sprags are used in coal mines for the purpose of checking the speed of the small cars used therein. When it is necessary to check the speed of a car or train of cars, a sprag is thrown between two spokes of a wheel. When the wheel has rotated so that the sprag strikes the beam of the car, rotation of that wheel ceases entirely and the sprag has served its purpose in that the momentum of the car or train of cars is reduced.

Upon a sprag depends the safety of a car or train of cars when running down a grade in a mine. The cars are not equipped with "brakes" as ordinarily are found on cars above the surface. However, if a sprag breaks, it ordinarily, precipates no undue excitement, for the train crew become, by experience, somewhat expert in placing a sprag even when the cars are moving rapidly. However, consuming companies generally, but not always, require sprags of certain specifications so that no undue risk is entailed by their use. A case where unusually small sprags were used came to the notice of the writer recently when in conversation with a mine "boss" who remarked with some bitterness, born of long usage of small sized sprags, that "this much-talked of conversation has a grand basis on which to make a claim by eliminating the small sprags from usage and thus prevent the undue waste, the breaking of the small-sized sprags entails."

Also, the species to which the making

SPRAG CUTTERS AND A PILE OF SPRAGS.

of sprags is restricted is the result of the necessity for strong and durable sprags. The oaks and maple are the species mostly used, the chestnut being excluded entirely. No softwoods are admitted and green timber is generally specified. However, in this respect, the companies are very lenient upon inspection and rightly so, as will be shown later.

As said before, the sprag industry is not of large size, and no doubt, represents a very small fraction of the entire wood product of the State. During the year 1912. the Delaware, Lackawanna and Western Railroad used 350,000 in their collieries. This represents a volume of 30,000 cubic feet, or 360,000 board feet of timber used in the collieries of one company for the purpose. It is estimated that about 6,000,000 sprags are used annually in the anthracite regions of Pennsylvania. Yet, since it is a product that may be made of what otherwise would be considered waste, it deserves attention in that such attention may be the means leading to the utilization of so-called waste for the purpose and not the oak and maple coppice of pole size from which almost the entire output is obtained at the present time.

An instance of such action has been observed recently. That section of northeastern Pennsylvania from which the anthracite mining regions draw a large part of their mine supply timber is divided into many units of ownership. Since the region is mainly a timber region, the individual owner depends largely on his standing timber for the greater part of his earnings. In view of the instance mentioned above, the owner advanced to that stage of forest mismanagement when his merchantable timber down to mine-tie size was cut. However, a thrifty stand of oak and maple coppice of twenty years' growth remained on the ground. The best of this growth was cut for sprag timber and thereby left a residue of poor and thriftless stuff to form the future forest.

On a certain tract in Monroe County which is covered with a twenty year coppice growth of chestnut and oak in equal proportion as to density and which is being cut for the purpose of making sprags, the writer paced off three areas of one-quarter acre each. The poles of sufficient size to make sprags were counted on each area, and the following is the result:

1st area 80 poles average 4 sprags each, 320 sprags
2d area 78 poles average 4 sprags each, 312 sprags
3d area 65 poles average 4 sprags each, 260 sprags

By this observation it could be ascertained readily that 1100 to 1200 srpags per acre could be got of well stocked oak and chestnut coppice forests of the age of twenty years.

The prevailing price for sprags is $12 per M. f.o.b. cars at shipping point. Dealers pay $1 per M. less. However, where sprags of the largest size are specified, as much as $14 per M. is paid.

Ten years ago, sprags were made entirely with axe and drawing knife. If a man made 200 of them per day, he was considered well at his trade. A machine was then devised with a knife which moved vertically with every revolution of the wheel which governed it. The sprag stick was held in an almost vertical position and at such a slant as to allow the knife, moving vertically, to taper the end of the stick to a point. At each fall of the knife, the operator would turn the stick a few degrees, and continued turning until the uniform taper was affected.

This machine gave poor results in that the process was too slow. It was not used very extensively and the sprag industry fell back into the domain of the handworker.

It was necessary to depend on the handworker only a few years, and three years ago, his elimination became permanent. A man of a mechanical turn of mind and now living at Mountain Home, Pa., devised a machine for the purpose by placing on a shaft two properly moulded wheels with planing knives set in each wheel. These wheels are so moulded that when they are placed one against the other on the shaft, the space between the two wheels in the direction of the shaft admits of a perfectly made sprag. A support on which to rest the sprag when in the process of making is built upon the base of the machine and extends upwards between the wheels to an inch below the plans of the axis. This support is raised by an extra block two inches higher at the circumference of the wheels, and in fact, must be adjusted so that the minimum jar is obtained.

A four-horse power gasoline engine furnishes sufficient power to turn it. However, the more power is used, the faster and better the sprags are made. The operator places a sprag stick between the wheels, and as the wheels revolve, the cutting knives reduce the stick at the proper place, and by continually revolving the stick, it effects the desired point. This processs is then repeated on the other end of the stick and thereafter, it is the finished product.

The sprag sticks are sawed in lengths with an ordinary circular saw attached to motive power. Two men can saw from 8,000 to 9,000 per day. However, it is inadvisable to saw such a large number at a time for the reason that the pile will become very large and, therefore, will necessitate carrying a great number of them a considerable distance to the machine.

One man can make one thousand sprags per day if the sticks are piled near him. Eight hundred sprags of mixed sizes make a load for two horses.

In the spring of 1911, a fire killed a stand of oak and chestnut coppice 14 years old on the Pocono division of she Minisink Forest Reserve in Pennsylvania on an area of about 75 acres. The timber was not merchantable because of size and the distance from market. However, the possibility of disposing of it in the form of sprags was looked into, and was found decidedly favorable. Accordingly, arrangements were made with the owner of the above mentioned machine for the use of a machine and the operation started. Almost 100,000 sprags were made from this area.

A contract was made with a party to furnish motive power and make the sprags complete from the pole for $4 per M., and incidentally he made good wages. It cost approximately $4 per M. to haul them to the railroad since only one trip a day was possible. To cut the poles in the woods cost $1.30 per M. sprags, making a total cost of $9.30 per M. sprags delivered at shipping point.

The use of the machine was obtained on condition that the output be sold to the owner of the machine who was also a dealer. Therefore, $11 per M. was received, leaving a balance of $1.70 for

timber. The Department of Forestry considered the operation a success in that it gave a return on what would have otherwise been waste material; also it removed so much dead material from the woods and thereby made the stand of dead trees less dense, and consequently, less of a tangle when they fall, thus assuring a fall closer to the ground and quicker decomposition.

Lying adjacent to this tract is a few hundred acres of oak and chestnut growth killed by the same fire. The sprag timber was gathered on about twenty acres, but on the remaining area, which is divided into a few ownerships and separate from the ownership of the twenty acres which were cut over, no attempt was made to utilize the timber, and the result is: a mass of wind blown trees covering the ground, an exhibition of wasted product, which, if taken in time, could have served a purpose of economic good.

During the winter of 1911-1912, there was undue activity in cutting oak and maple poles for sprag timber in the region adjacent to the above referred to areas. Undoubtedly, almost a sufficient amount of timber could have been procured on the burned area to supply the sprags that otherwise were supplied from this region. The dealers preferred green timber in preference to dry timber for the reason that it worked with less exertion on the part of the operator. A profound regard for the literal meaning of "take no thought of the mo row, etc.,", reinforced by the above referred to subserviency of spirit, resulted in an economic loss to the community of both the labor, cost, and the profit of operation of the dead stand as well as the loss of the growing stock of a future stand.

The sprag industry is, typically, an industry which disposes of otherwise waste product in the ordinary lumbering operation, in that the consumption of sprags is of very limited extent and can be supplied by such "waste"; and besides, the very nature and dimensions of this product calls for that part of the product of the ordinary lumbering operation—especially where mine supplies are the chief product of such operation—which is considered "waste."

THE ANNUAL MEETING

HAVING cooperated with the National Conservation Congress in the very successful forestry conference in November, the annual meeting of the American Forestry Association at Washington, D. C., on January 14, 1914, was confined to a business session, for the election of officers, the adoption of a platform of principles and policy and consideration of routine business.

Henry Sturgis Drinker, president of Lehigh University, was re-elected president of the Association; Hon. Franklin K. Lane, Secretary of the Interior; Hon. David Houston, Secretary of Agriculture, Hon. Thomas Nelson Page, United States Ambassador to Italy and Mr. George W. Vanderbilt were added to the list of vice presidents, the gentlemen who served in this capacity last year all being re-elected.

Mr. Otto Luebkert of Washington, D. C., was re-elected treasurer.

Mr. C. W. Lyman of New York, Mr. Charles Lathrop Pack of Lakewood, N. J., Mr. John L. Weaver and Mr. Otto Luebkert of Washington, D. C., were re-elected directors for a term of three years and Mr. Alfred Gaskill, State Forester of New Jersey, was newly elected a director for the same period. Mr. E. A. Sterling of Philadelphia was re-elected an auditor for two years.

The platform of principles and policy which was unanimously adopted will be found in the front section of this magazine.

It was decided to hold the 1915 convention at San Francisco, during the Panama-Pacific International Exposition, the date to be selected shortly. The day selected is to be known as American Forestry Association Day, and it is the purpose of the Association to invite every country in the world to send representatives, and invitations will be extended to all State forestry organizations, conservation associations and commissions, fire protective bodies and lumber and paper trade associations to send delegates. It is proposed to make it the greatest gathering of foresters, and all interested in forestry, that the world has ever seen.

The financial report was the most encouraging that the Association has heard since its organization. Not only was the work of the Association greatly extended during the year, its general activities increased and its magazine greatly improved, but it increased its membership by adding over fifteen hundred new members and earned a considerable fund which will be used in further development work during the present year.

The report of the Secretary, P. S. Ridsdale, was as follows:

THE SECRETARY'S REPORT

The Secretary reports that the Association's work during 1913 has resulted in a gratifying growth of the interest in forest conservation, and a generally wider appreciation of the activities of the Association, and the value of such an organization. This is indicated in the increase in membership during the year, the greater number of requests for forestry literature and advice regarding forestry development, and the broader general knowledge that the Association is working along essentially practical lines in furthering forestry conservation. The Association continues to be self-sustaining and the financial difficulties which it experienced in past years are not likely to be renewed. There is a steady increase in active membership and in demand for the magazine and this growth is general and not limited to any one section of the country.

It is satisfactory to note that big timber owners, lumbermen, loggers, wood preservers and all others interested in the growth of trees and the uses of wood are acquiring, in greater number, an interest in the work of the Association: and a realization of its need. There has not been, to the knowledge of the Secretary, any adverse criticism of the work which is being done. In-

stead this work and the results achieved have been from time to time heartily commended by various lumber and paper trade publications and by the newspapers and magazines, as well as by individuals.

During the year the Association took an active part in approving or opposing various forestry legislation, both State and National. The effort to take 40,000 acres of the Pike National Forest from the control of the Secretary of Agriculture and turn it over to Colorado Springs and Manitou, was successfully opposed, with the result that the two towns now have the watershed protection they needed while the forest on this watershed remains under the administration of the Department; valuable assistance was given in securing the passage of forestry legislation in Pennsylvania; in preventing the New Hampshire legislature passing unwise forestry laws which would have hampered the State Forestry Department; in aiding the Wisconsin State Forestry Department's opposition to political interference with its work; and in giving aid and supplying information to various forestry organizations, forest schools, forestry committees of different associations, and to individuals.

The Association also opposed reductions in the Agricultural Appropriation bill for the Forest Service work; and did what it could in enlightening members of the 62nd Congress regarding the States Rights movement, and various forestry legislation which was presented or was proposed for presentation to the Congress. Letters from the Association to various clubs of the American Federation of Women's Clubs resulted in large numbers of letters and resolutions protesting against State control of the national forests being sent to members of Congress.

During the year the Board of Directors and the members of the Executive Committee have been most active in looking after the business of the Association and in directing the work. The directors held a meeting at Asheville, N. C., on March 25, 26 and 27 and there an examination was made of the forest planting on the estate of Mr. George W. Vanderbilt, of the forestry conditions on Mt. Pisgah and addresses were given at a large public meeting in Asheville by President Henry Sturgis Drinker and other officials and members of the Association. In July the directors held a meeting at Lake Sunapee, N. H., in conjunction with the Society for the Protection of New Hampshire forests and various other forestry, timberland and fire protective societies and there forestry addresses were made by its officers and members at several public meetings. The Association was also represented by officials and members at a number of conventions of forestry organizations, lumber, timberland, forest fire protective and wood preservers associations and conservation bodies during the year, both in the United States and Canada, this resulting in a wider knowledge of the Association's activities and a deeper appreciation of what it has done, is doing and is striving to accomplish.

Too much importance cannot be attached to the value of the Association's cooperating with the National Conservation Congress in securing the investigation, by competent committees, of vital questions in forestry and lumbering. Several of our members raised several thousand dollars which enabled the forestry committee and its ten subcommittees to not only thoroughly investigate various phases of forest fire protection, forest planting, State forest policy, Federal forest policy, forest taxation, forest investigations, lumbering, forest publicity, forest school education, and forest utilization, but to have these reports printed in pamphlet form for general distribution at the Congress here in November, and now to be published in book form together with the discussions on the reports, the addresses and the resolutions of the forestry section of the Congress, as a matter of permanent record. Officials of the Association composed the Forestry Committee of the Congress and most of the members of the sub-committees are members of the Association, while the office force of the Association gave much time during the fall to aiding in this work, and to the details of ar-

ranging for the forestry banquet given here during the Congress.

During the year our president, Henry Sturgis Drinker, president of Lehigh University, has delivered addresses on forestry at Tome Institute, Md., Lake Sunapee, N. H., Asheville, N. C., the Wholesale Lumber Dealers Association convention at Atlantic City, Allentown, Pa., Wilkes Barre, Pa., and other places and these have been published and widely distributed.

The Board of Directors has arranged to hold a meeting at Cornell University on May 15, at which time a new forestry building is to be dedicated, and also to hold a meeting at Chautauqua, New York, in July, upon which occasion the five thousand people expected at Chautauqua at that time will be addressed on forestry subjects at six big meetings, lasting through two days. This meeting is expected to prove of great educational value to the forestry cause.

The Board has also arranged to hold the annual convention of the Association in 1915 at San Francisco, during the Panama-Pacific International Exposition, at which time it is expected to have representation from every country in the world having any interest in forestry. The Exposition managers have offered to set aside a special day of the Exposition to be known as American Forestry Association Day, and plans are already under way for making this day the most notable in the annals of forestry in this or any other country.

A membership and circulation campaign was conducted steadily during the year by means of letters sent to persons who are or who should be interested in forestry conservation, names being secured from personal nominations by members, and from lists of various organizations. This sort of campaign was effective enough to secure 1,520 new members and subscribers. A still more effective method of securing members and subscriptions would be the placing of field agents in various sections of the country, these agents being qualified to make addresses on forestry, to aid State and local forestry associations in perfecting their organizations and to generally arouse interest in the forestry conservation movement, as well as to personally solicit memberships and subscriptions.

It is gratifying to state that the financial report of the treasurer shows a healthy and a steady growth, the receipts from memberships, subscriptions, and advertising being more than in any year in the history of the Association.

It is perhaps unnecessary to call attention to the improvement in the quality of the magazine AMERICAN FORESTRY during the year. Not only has there been a marked improvement typographically, and in the quality of the paper used but the effort to secure articles of greater value and interest to the readers has been successful, while the increase in the number of illustrations used has materially added to the attractiveness of the magazine. These improvements have been made at considerable cost but they have been valuable in drawing attention to the magazine, holding the interest in it, and in inducing voluntary subscriptions.

Two features, in the conduct of the magazine during the year, deserve special attention. One was the greatly enlarged November issue, devoted to forest fire protective work and profusely illustrated in colors, the cost being about twice that of the regular number; and the other being the additional special number issued during the sessions of the National Conservation Congress and summarizing, for the benefit of all our members and subscribers, as well as for general distribution at the Congress, the work of the forestry committee and the ten sub-committees.

Twenty-five hundred additional copies of the May issue were printed for distribution at the forest exhibition of the Pennsylvania Forestry Association in Horticultural Hall, Philadelphia, during the week of May 19, at which time the Association had an exhibition which attracted much attention.

In July the Association took over the business management of the *Forestry Quarterly*, Dr. B. E. Fernow of Toronto remaining in editorial charge. The Association is assured by one of its members against any loss in the pub-

lication of the *Quarterly*, So far, however, there has been a small profit and this will be increased during the coming year.

The Association acknowledges with thanks and appreciation contributions from Mr. Charles Lathrop Pack, The Lehigh University Forestry Fund, through Dr. H. S. Drinker, Mr. W. R. Brown, Capt. J. B. White, Robt. P. Bass to provide for the work of the forestry committees of the National Conservation Congress and the publication of their reports; from Mr. Charles Lathrop Pack and the Forestry Fund of Lehigh University, through Dr. H. S. Drinker, for the foresters banquet at Washington, D. C., on November 19; from Mr. Charles Lathrop Pack and the International Paper Company of New York, for improvements in the magazine, and the bequest of $5,000 from the estate of Miss Jane Smith of Pittsburg.

PRIZE FOR AN ESSAY ON FORESTRY

THE Indiana State Board of Forestry, in the endeavor to get everyone interested in the preservation of forests as far as this can be done without loss to owners, and the establishment of forest plantings on all land that is not suited for agriculture, has offered prizes aggregating $40.00 for the best essays on Forest Influences. $12.50 is to be given for the best essay and $7.50 for the next best. Also $12.50 is to be given for the best and $7.50 for the next best essay by pupils in the graded and country schools. The essay must not be more than 2,000 words. It should be mailed to Elijah A. Gladden, secretary of the State Board of Forestry, Indianapolis, not later than May 1. He will be glad to send anyone the rules governing the contest.

INDEX FOR 1913

The Index for Volume 19, 1913, of American Forestry is now ready and may be had on application by mail or otherwise by any subscriber or member. Requests may be sent to the main office of the American Forestry Association, 1410 H Street, Washington, D. C.

There are several bands of the Persian fat-tailed sheep on the national forests of southern Utah. The large fat tail sometimes weighs as much as forty pounds, and, like the hump on the camel, is a reserve supply of nourishment when food is lacking.

Dr. B. E. Fernow, dean of the forest school of the University of Toronto, and Bristow Adams, of the U. S. forest service, have just been elected president and secretary, respectively, of the society of American foresters, the only organization of professional foresters in the western hemisphere.

HETCH HETCHY TIMBER AFFECTED

SPECIAL investigations by the experts of the Department of Agriculture have shown that as much as 95 per cent of the timber in some of the canyons and valleys of the Toulumne River, which is to supply the water for the Hetch Hetchy project, has been killed by bark-boring insects.

The areas in which practically all of the timber has been killed, some of it many years ago, are Jack Main Canyon and Matterhorn Cznyon. It was found that the forest growth of the entire watershed was more or less affected, and that the dustructive insects were killing a great amount of timber from near Tenaya Lake through the forests surrounding Toulumne Meadows to and through Virginia Canyon.

This alarming condition, affecting as it did the scenic beauty of the area north of the Yosemite Valley and its consequent effect on the water supply and general economy of the Hetch Hetchy project, presented a problem of great importance.

As soon as the matter was called to the attention of the Secretary of the Interior in the fall of 1912, he appealed to the Secretary of Agriculture for such advice and assistance as his Department could render through the expert who has charge of the forest insect branch of the Bureau of Entamology.

The matter received the required prompt attention and arrangements were soon made for active warfare against the depredating beetle. A plan of procedure was outlined by the expert and recommended by the Secretary of Agriculture to the Secretary of the Interior. According to the plan, the Interior Department was to allot the required funds, the control work to be carried on under the immediate supervision of an entomological assistant of the Bureau of Entomology. This plan was adopted and the work was started just as soon as the weather conditions permitted in June, 1913.

The areas near Tenaya Lake and in the Cathedral Basin around Toulumne Peak to the Toulumne Meadows were carefully cruised for the location and marking of the particular trees, in the bark of which the broods of the destructive beetle had passed the winter. Two areas representing centers of infestation were thus located and designated —one as the Tenaya Project, the other as the Cathedral Project.

Control work was started on the Tenaya Project on July 1, and finished when the beetles began to emerge from the bark on July 24th. Work on the Cathedral Project was started on September 8th, after the beetles coming from the overwinter broods had entered the bark of the living trees, and was completed on October 7th.

The method recommended and followed was to fell the infested trees, lop off the limbs, pile them on the prostrate trunk, and set fire to it; thus the infested bark was scorched or burned to a sufficient extent to kill the broods of the insects. The trees thus treated ranged in diameter from 6 inches to 54 inches, with the average of about 22½ inches.

One thousand, six hundred and seventy-one trees were treated in the two projects, at a cost of $1,158, including all expenses except the salaries of two representatives of the Bureau of Entomology who directed and assisted in the work.

It is claimed that this work, with an additional expenditure of about $500 next season, will be sufficient to bring the beetle under such control that very little attention will be required to protect the remaining living timber from further serious injury. Both, this and an infestation in the timber around the rim of the Yosemite Valley will receive the required attention next season. The Interior Department has expressed a determination to prosecute a warfare against the depredations of insects in the Yosemite and Glacier National Parks to the limit of the funds available for the purpose.

The insect which is directly responsible for the death of such a large percentage of the lodgepole pine timber of the northern section of the Park is known as the mountain pine beetle, the technical name of which is *Dendroctonus monticolae* Hopkins. It attacks perfectly healthy trees and kills them by mining between the bark and wood in such a manner as to stop the movement of sap and kill the bark which results in the final death of a tree within ten to twelve months after it is attacked. This beetle is the most destructive enemy of the lodgepole pine, western yellow pine, and mountain or silver pine of the entire Pacific Coast and Northern Rocky Mountain region. A vast amount of the best timber of these regions has been killed by this beetle during the past fifty years and has gone to waste through the agencies of decay and forest fires, but, thanks to the discoveries of the experts of the Bureau of Entomology, it can now be controlled and a great waste of forest resources prevented in the future.

FORESTRY LAW FOR VIRGINIA

A NUMBER of Virginians, interested in the proper management of the forests of the state are urging the members of the state legislature to pass a new forestry law at the present session. This law provides for the establishment of a permanent Forestry Board, which shall employ a technically trained forester who shall have power to carry on fire protective work and other functions of a state forester. An appropriation of $10,000 is to be asked for carrying on the work during the present year.

The law was drafted by Dr. Howard S. Reed and his associates of the Virginia Polytechnic Institute at Blacksburg, and has already been fully explained to the Executive Committee of the Board of Visitors of the college. The law provides that this Executive Committee shall serve as a State Forestry Commission without compensation.

Besides providing for the other regular duties of a state forester the proposed law provides that he shall annually deliver a course of lectures at the Institute at Blacksburg upon forestry and silviculture; shall give instruction in farm forestry to the county demonstrators and by lectures before farmers institutes and other organizations.

The prospects of this bill passing the legislature and being signed by the Governor are bright.

GOVERNOR GLYNN FOR FORESTRY

GOVERNOR Martin H. Glynn of New York is an ardent believer in forest conservation, and in his message makes recommendations regarding forestry conditions in the state which will be heartily endorsed by every one who appreciates the value of the forests and their perpetuation. He declares that the forests are the foundation of all conservation activities as they provide water supply, forest products and a home for fish and game. He urges resumption of buying of forest lands for the extension of the Adirondack and Catskill parks. He calls attention to the fact that the reforestation of state lands is making slow progress and that instead of a few thousands, tens of thousands of acres should be planted annually. He believes that the state should go further than providing seedlings at cost for the replanting of

private forest lands and should plant these lands at cost, as its forestry employes know the business of tree planting and private owners do not. He also urges the amendment of the State Constitution as follows: (a) To permit the leasing of camp sites in the State Forest Preserves, to afford the people a freer and more satisfactory use and enjoyment of their own recreation grounds; (b) To permit the utilization of mature and dead timber in the Forest Preserves, under State supervision, which would not only result in a revenue of millions annually to the state, but would also improve the condition of the growing timber in several ways; (c) And, to authorize the construction of roads through the Forest Preserves for forest fire protection and other public purposes.

A SOUTH CAROLINA FORESTRY LAW

A DETERMINED effort is to be made to have the South Carolina legislature pass a forestry law this year which will give to the state the kind of forest management best suited to the interest of its people.

The proposed law provides for the appointment of a state board of forestry, comprising nine members, the Governor of the State, the director of the South Carolina State Experiment Station; the Commissioner of Agriculture; the president of the University of South Carolina; the President and the professor of Forestry at Clemson Agricultural College, and three persons to be appointed by the Governor.

This board is to appoint a technically trained man as state forester at a salary not to exceed $2,500 a year. He is also to act as secretary of the board.

The forester is to have charge of all matters pertaining to forestry in the jurisdiction of the state; to carry on an educational forestry campaign by giving lectures, preparing bulletins, advising colleges and schools regarding courses of instruction in forestry; to co-operate with towns, corporations and individuals in preparing plans for the utilization, protection, management, and replacement of trees, wood-lots and timber tracts, under an agreement that parties obtaining such assistance pay the field expenses of the men employed in preparing such plans; to have charge of all the forest wardens, employ proper means to prevent and to fight forest fires and to enforce forest and woodland laws.

The law also provides that all rural lands to which the state now has title, or may acquire title, shall if suitable for a forest, be held as a state forest. These lands are then to be used to demonstrate the practical utility of timber culture and for the purpose of forest management.

Stringent provisions are made in the proposed law for fire protection on the lines approved by the Forest Service. The proposed law also provides for an appropriation of $10,000 for the salary of the state forester and the expense of carrying on his work in 1914.

There are 36,500,000 young trees in the government's forest nurseries.

Two tons of cascara bark have just been sold from the Siuslaw national forest, Oregon, at one cent a pound.

The northernmost national forest is the Chugach in Alaska; the southernmost is the Luquilloin Porto Rico.

For shingles alone, 750 million feet of timber is cut in that part of the state of Washington which lies west of the Cascades.

A SYLVAN MEMORIAL

By Wm. R. Fisher

THE planting of a tree, here and there, to commemorate the visit of a distinguished person, or to mark some notable event, has been a common custom for a long time. Usually there is much ceremony and a gathering together of a crowd of onlookers and some prominent locality is selected for these formal tree plantings—the college campus, the city park, or the site of historic doings,—memorable achievements of the peaceful arts, or the warrior's reminder "of old, unhappy, far off things, and battles long ago."

But the planting of some thousands of seedlings, with the intention of making trees, when they grow up, serve as a memorial to the dead, instead of erecting a monument of carved stone, is certainly new and interesting to the forester.

Mrs. Flavia Camp Canfield, widow of the late James Hulme Canfield, LL. D., a former president of the Ohio State University and subsequently Librarian of Columbia University, New York City, has recently devised this novel and beautiful tribute to her departed husband. At the family homestead at Arlington, Vt., twenty thousand white pine seedlings have been set out, and the plantation will hereafter be known as the Memorial Pines.

One may hardly say of such a monument what the Roman poet said of his verse—that it would outlive a monument of bronze; and yet, under watchful care to exclude destructive fires, there is no limit to the continuance of such a woodland.

Most people find it hard to break away from the conventional way of doing things. It is not likely that there will be many imitators of this lady, but there are some who will feel that no more dignified method could be found, of expressing love and respect for the memory of one who has gone than this sylvan monument.

FULL TITLE UNDER THE WEEKS ACT

The completion of the payment by the United States government, acting through the department of agriculture and the forest service, for lands in the town of Benton, New Hampshire, sold by the Pike Woodlands company and E. Bertram Pike, places the Federal Government in full title and possession of the first tract which it has acquired in the White Mountains under the Weeks act.

The Moosilauke tract comprises the northerly and westerly slopes of Mount Moosilauke and will furnish a valuable example of modern forestry practice under varied conditions which are typical of large areas in our mountain region.

It is understood that the Forest Service will proceed at once to construct necessary trails and fire stations in order that the property may be protected from injury by fire and at the same time may be accessible to the public for all reasonable uses. The mature timber on the tract will probably be sold for commercial uses, the cutting being conducted in such manner as to benefit rather than to injure the remaining growth.

The tract is quite accessible to the public, being only a short distance from the Glencliff station on the White Mountain division. It adjoins the property owned by the state in connection with the sanitarium at Glencliff. Mr. Pike owns or controls large areas in the same vicinity which he is planning to improve on forestry lines, including the extensive tract owned by the Lake Tarleton club in the town of Piermont which overlooks the Moosilauke reservation.

Allen Hollis, Esq., of Concord, who represented Mr. Pike and the Pike Woodlands company in the proceedings for condemnation, is receiving congratulations in being instrumental in bringing into New Hampshire the first actual payment on account of a government purchase.

GOVERMENT MAKES LARGEST OFFERING OF TIMBER

WASHINGTON, Jan. 5.—Secretary of agriculture, Houston has today approved the disposal of one billion feet of western yellow pine timber from the Kaibab national forest in northern Arizona. In order to get this timber out it will be necessary to build a railroad approximately 200 miles long. Such a railroad will connect Colorado and Utah with the world-famous Grand Canyon of the Colorado, which hitherto has been accessible only from the south.

For several years the construction of such a railroad has been considered by various capitalists, but it has been stated that the lack of assured immediate traffic was an effectual barrier. It is pointed out, however, that a contract for a billion feet of timber will overcome this difficulty by providing a commodity for transportation which, together with tourist and local traffic, will place the project on a paying basis practically from the outset.

Chief forester Henry S. Graves made a personal examination on the ground, and this examination supplemented by the reports of his forest engineers, induced him to recommend the sale of such a large body of timber in order that the country might be developed through the supplying of this resource. Mr. Graves says, however, that the Kaibab forest is one of the most beautiful in America, and gives assurance that the marketing of the mature crop of timber will not be allowed to mar the scenic beauty of the region.

In accordance with the timber sale policy of the government the stumpage will be disposed of to the highest bidder. In order to attract a sufficient investment to assure the building of the railroad and of the necessary lumber mills at least a billion feet of timber had to be offered. The investment necessary to make this timber accessible will amount to more than $3,000,000. By placing this quantity of timber before the lumbermen of the country the officials of the forest service believe that the development of extensive areas in southern Utah may be looked for, because the necessary railway will render accessible resources which have heretofore been undeveloped. The whole region is rich in agricultural land, in cattle and sheep range, and in coal and copper deposits, as well as in timber.

What a Forester Should Be

This definition by Dr. C. A. Schenck of what a forester should be well deserves reproduction. He says:

"A forester should stand the life in the woods like a tree; and should stand the knocks in the mill like a log; lest he go to waste with the culls."

ANNUAL MEETING OF THE NEW YORK STATE FORESTRY ASSOCIATION

THIS active and growing organization in the Empire State held its first annual meeting on January 22, 1914, at Albany in the new Educational Building. The attending foresters were welcomed by Dr. John H. Finley, President of the University of the State of New York, and Commissioner of Education. Dr. Hugh P. Baker, a member of the American Forestry Association and now head of the State Forestry School at Syracuse University, New York, was the organizer, and is the Secretary of the Association, which is already doing a great work for New York State in the promotion of the State's forestry interests. There was much interesting discussion relative to the extension and care of the State's forest reserves and particularly of the proposed amendment of the existing provision in the State's Constitution forbidding all cutting on the State reserves.

Dr. Henry S. Drinker, President of the American Forestry Association, was present by invitation, and made an address in which he touched as follows on the above question:

"Foresters and the friends of forestry in your sister States are noting with great interest the discussion in New York looking to a revision of the policy adopted in the past of denying to New York the benefit in the management of the State's woodlands of the principles of forest culture, cutting, and reproduction that have been generally approved in Europe and America as conducive to the economic and profitable management of forest lands.

"Local conditions may have made it necessary or advisable to deny to your State forest lands the exercise of the principles of forestry, in the interest of retaining your forests for a time in a wholly wild condition as a refuge for game and a wilderness home for the man who would for a time fly from civilization, but surely with forests aggregating over 1,600,000 acres in New York State, by far the largest State Forest Reserve of any State, the time must soon come when the State constitutional prohibition against all cutting shall be amended, and the great Forest Reserves shall be handled as the National Forests are so admirably handled, with a view to the best care and conservation of your woodlands for the benefit of the people at large of the State and of the State's industrial interests."

MASSACHUSETTS WANTS STATE FORESTS

MASSACHUSETTS, which has only a few hundred scattered acres of state forest land now wants its legislature to pass a law creating a state forest commission to acquire land suited for forestry and create state forests. About one million acres, one fifth the area of the state is now wild and waste land, worth very little. Private owners cannot afford to reclaim this land, many of the towns are too poor to do so and the state is the only agency that can deal with the problem.

If the proposed measure becomes a law, the land will be well protected against forest fires; employment may be given prison labor; the forests could be used for public recreation and could become bird and game sanctuaries; as well as serve the very practical purpose of protecting water from impurities and conserving water power.

An earnest effort, in which the Massachusetts Forestry Association is aiding, is being made to have this proposed law passed.

ANNUAL REPORT ON YOSEMITE NATIONAL PARK

THIRTY-FIVE miles of new trail have been built in Yosemite Park during the last year, according to the annual report of the superintendent, recently made to Secretary Lane. There are now in the park 578 miles of trail and 147 miles of wagon road.

"In order to protect the big trees from fire," says the superintendent, "approximately 80 acres of the upper grove of the Mariposa Big Trees have been cleared of debris, fallen timber, and jungle growth of shrubs and young yellow pines and firs. Sixty acres of this tract were cleared some years ago while the grove was under the control of the State of California.

"In order to thoroughly safeguard this portion of the national park from fire the work should be continued next year and succeeding years until both groves are cleared and a fire brake constructed on the eastern boundary. This clearing process should be extended to the Toulumne Grove of Big Trees where it is much needed.

"On October 30, 1913, there was planted on both sides of the road extending from the Sentinel Bridge to Kenneyville on the north side of the Merced River, a row of sequoia seedlings. The rows were placed 104 feet apart, the trees in each row 80 feet apart. Another line of sequoias was planted on the northern border of the woods which grow in the southern part of the meadow lying west of the village.

"On the same date a party of enthusiasts planted six sequoia seedlings in a semicircle around the front of the Le Conte Lodge. There has also been planted on both sides of the road between Camp Ahwahnee and Pohono Bridge, at suitable places, sugar-pine seedlings, rows and plants at suitable distance apart. Likewise have sugar-pine seedlings been planted near the river along the meadow below the mouth of the Yosemite Creek.

"October 30 has been designated as "Arbor Day" for the Yosemite National Park, and the avenue from the Sentinel Bridge to Kennyville has been named "Sequoia Lane." A future generation will there observe the most beautiful avenue in the world."

THE FIRE FOOL

(With apologies to Rudyard Kipling)

A fool there was and he flung a match
Even as you and I,
Carelessly down on a sundried patch
Giving no heed that a fire might catch
And spread to the timber with quick dispatch,
Even as you and I.

The fool returned on his way and found
Even as you and I,
Ashes and embers all over the ground,
And far in the distance with horrible sound
The fire consuming the timber around,
Started when he went by.

The fool passed on with a wondering look
Even as you and I.
He couldn't explain the fire that took
The forest away, and dried the brook,
And left the region a place forsook;
He was a fool—that's why.

A. G. Jackson in *Seattle Sun.*

FOREST NOTES

New York City is far behind many smaller cities of the country in controlling the planting of trees in its streets and in the care of trees after planting. The Landscape Engineer of The State College of Forestry at Syracuse is making a very careful reconnaissance survey of street in New York in cooperation with the Tree Planting Association of the City for the purpose of securing material which may be used to stimulate interest in more and better street trees. It is believed that the interest aroused will result in the formation of a definite and unified system of tree planting under the direction of a Tree Planting Bureau headed by or made up of trained Foresters.

The rates of transportation into and through the Yellowstone National Park by way of the western entrance at Yellowstone, Montana, have been reduced 20 per cent by Secretary Lane. This means that one dollar a day has been taken off the rate which has heretofore been charged to tourists in the park coming through this entrance. This reduction is due to a contract for carrying passengers in the park which has been awarded by the Department of the Interior to Messrs. F. J. Haynes, Robert Duff, and R. W. McTavish, a corporation known as the Yellowstone Western State Company. This action is greatly in the interest of the traveling public, inasmuch as it will enable persons to make the complete park tour for $20 whereas the rate heretofore has been $25. Corresponding reductions will be made in the 4-day, 2-day and other short trips in the park.

Acting Secretary of Agriculture B. T. Galloway has just given a permit to James Lindsey, of Portland, Oregon, for the construction and operation of a power plant on Mill Creek, Douglas County, Oregon, within the boundaries of the Siuslaw national forest.

Mr. Lindsey intends to transmit the power obtained from this hydro-electric plant a distance of eighteen miles to Reedsport, Oregon, where it will be used in the manufacture of pulp. There are now at Reedsport a fish cannery, a cold storage creamery, and a warehouse, but when the Southern Pacific Railroad completes the extension upon which it is now at work, Lindsey and others who are associated with him in the development of Reedsport believe that the town will become a valuable manufacturing and shipping center. Besides the power plant and pulp mill, other industries are contemplated by the men interested in the town. They claim to see possibilities of an excellent future, based upon resources, power, and transportation facilities.

The largest remaining virgin stands of white pine in the United States are found in Minnesota, according to a State report recently published. These, in addition to the stands of Norway and jack pine, spruce, tamarack, and balsam fir, add much to the State's timber wealth and make it contain some of the most valuable timber resources east of the Rockies.

The report which gives these facts deals with the wood-using industries of the State and is the result of cooperation between the State and Federal authorities. The field investigations were conducted by members of the U. S. forest service. Certain statistics on present and future supplies of Minnesota's timber were contributed by W. T. Cox, State Forester, who brings out the diminishing timber resources of the State, and advocates measures for conserving them.

Twenty different wood-using industries are reported, not counting sawmills, shingle mills, cooperage and pulp

works, which are not included in an investigation covering only manufactured commodities.

The wood-using industries require 45 kinds of wood, of which 20 grow in Minnesota and all but three are native to the United States.

The widening and repairing of the roads in the Mesa Verde National Park is what is most needed to make that reservation accessible to tourists, according to the annual report of the superintendent. This park is in southwestern Colorado and has an area of about seventy-six square miles.

Secretary Lane, of the Interior Department, has asked the President to withdraw certain lands for the proposed Denver Mountain Park, Colorado, pending consideration by Congress of a bill for the creation of the park. The area covered by this withdrawal is over 34,000 acres. In a general way this land is of no substantial value for agricultural, mineral or other purposes, though it is an ideal location for a park. It is in a region of broken land, rocky in character and having many canyons, but the City of Denver desires to inclose the tract, if ceded to it for park purposes, police it, build drives to and through it, and, generally speaking, make it one of the additional attractions of the city.

The Northern Forest Protective Association of Michigan has just completed the posting of nearly one thousand direction signs upon the outlying roads and trails of the Upper Peninsula. These signs were put up solely as a kindness to woods travelers, and to properly direct them to the location being sought or to a place where protection and lodging could be found.

This is the first effort with any breadth of scope to properly designate the roads and camps of the Peninsula, and if it meets with the approval of the general public it will be continued until it is almost impossible for one not familiar with the woods to become lost.

During the season of 1913 travel to the Mount Rainier National Park increased 52 per cent as compared with 1912, according to the annual report of the superintendent, recently made to Secretary Lane. Mount Rainier is one of the most accessible of the national parks, being only 56 miles from Tacoma and 93 miles from Seattle.

Near the center of the park is the summit of Mount Rainier, from which radiates a system of glaciers ranking in importance with any similar system or group of glaciers in the world. There are more than a score of these glaciers from which flow headwaters of four important rivers—the Nisqually, the Puyallup, the White, and the Cowlitz.

California led last year in timber sold from national forests, though Montana has the largest number of sale transactions.

The biological survey and the forest service have been co-operating in the extermination of ground squirrels on national forests in California. The annual loss of range feed and grain crops from ground squirrels is enormous.

STATE NEWS

Michigan

At a recent meeting of State Forest Service officers, plans were formulated for bringing about the State and Federal Government the exchange of a considerabel acreage of forest land. As a result of this meeting the examination of the lands in question was begun and the field work will probably be completed by the middle of January. The State lands which the Government will acquire, consist of about 15,000 acres intermingled with the Government holdings in the Marquette National Forest in Chippewa county and in the Michigan National Forest in Iosco county. In exchange for this, the State is to receive an equal area of Government lands. Should this exchange be consumated, it will result in the addition of about 4,000 acres to the Marquette National Forest and 11,000 acres to the Michigan National Forest. On the other hand, the acreage of the Higgins Lake State Forest in Crawford and Roscommon counties will be increased by about 1,400 acres, the Houghton Lake State Forest in Roscommon county by 3,600 acres and the Lake Superior State Forest in Luce county by 10,000 acres. From an administrative point of view, the exchange would be highly beneficial to both parties, inasmuch as it would be a big step towards the consolidation of their respective holdings.

To keep pace with the increased demands for planting stock for reforestration projects on the State Forests, the nursery at the Higgins Lake State Forest has recently been enlarged. Formerly this contained only five acres. With the addition that has been made, there are now a little over ten acres of available growing space. At present there are in the nursery approximately 3,000,000 seedlings and transplants of various coniferous species. The addition will make it possible to double, or perhaps treble the present output.

Pennsylvania

The Department of Forestry announces the final purchase of what is known as the Pine Grove Furnace property in the South Mountains. This property was for a long time under the direction of Jay Cooke who was very largely instrumental in helping to finance the civil war. With the recent turning over of 7,562 acres of land, the State now owns in the South Mountains a forest extending in one continuous body almost from the Susquehanna river to the Maryland line, and having a total area of 70,000 acres and bringing the total acreage of the State forests up to 994,062.

Georgia

Recently a woodlot was examined and reported on in Habersham County by officials of the Forest School, University of Georgia, and on this trip an address was made before the Nacoochee Institute at Sautee in White County.

Later on Professor Akerman made a trip on the other side of the Blue Ridge, delivering addresses at Hiawassee, Young Harris, and Blairsville, reaching over 900 persons. The talks stressed the need for protection from fire. At the time fires were running in the mountains and the air was full of smoke, so that the talks were to the point.

Kentucky

During the latter part of 1913 there were a large number of forest fires, particularly in the eastern part of Kentucky. State Forester Barton says: "The fire plan inaugurated by the office of the State Forester in cooperation with the Forest Service of the United States Department of Agriculture has been effective so far as we have been able to put the plan in operation in the field in the suppression and control of a large number of forest fires. In addition it has been of great educational benefit in serving to call the attention of the people to the large number of forest fires which occurred in the State and especially after such a long dry season as the past summer. While the statistics with regard to the number of fires, cause, etc., have not as yet been compiled, a casual survey of them is interesting in that it shows that the two chief causes of fires are the railroads and the carelessness of hunters.

"The demand for county forest wardens in the eastern part of the State has been greater than the ability of this office to supply such wardens with funds available. There does not, however, seem to be any question about the fact that the forest protective measures initiated by the State Board of Forestry meets a real need, that the work is meeting with the support of the timberland owners and other timber interests, particularly in the eastern section of the State where the large timbered areas are."

The biennial report of the State Forester is in the course of preparation and will be ready for the Legislature about January 1.

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AMERICAN FORESTRY will print free of charge in this column advertisements of foresters wanting positions, or of persons having employment to offer foresters

WANTED—A position as an inspector of ties, timbers and lumber, by a forest school graduate with experience in inspecting ties, timbers and lumber. Can furnish best of references. Address Inspector, Care AMERICAN FORESTRY.

Graduate forester, with three years of practical experience in Austria, wants position. Best of references. Address GEORGE RACEK, 6th Avenue, 2133, Seattle, Wash.

Graduate of Forestry School, having studied forestry and lumbering operations in this country and Germany, with experience in the U. S. Forest Service, and also in state and private nursery work, would like position with forest engineering firm or lumber company. Best of references. Address XY, Care of AMERICAN FORESTRY.

POSITION WANTED.—On private estate: By forester now in U. S. Forest Service. Understands all branches of tree surgery, surveying, drainage, road building, bridges and culverts, concreting and landscape. Best of references furnished. H. M. C., Care AMERICAN FORESTRY.

FORESTER of technical training and practical experience in the United States and Germany wishes to better position. Best reference from German Aberforster and others. Address "S," Care AMERICAN FORESTRY.

WANTED—Situation as Woods Superintendent on private estate or hunting preserve, by graduate Forest Engineer with thorough experience and training, both here and abroad, in forest management and the proper care of woods and game. Well recommended. Address, MANAGER, Care AMERICAN FORESTRY.

WANTED—BY a graduate forester, a position on reforestation work, or with a landscape gardening firm. Experience Northeastern. References if desired. Address "S. D. H.," Care AMERICAN FORESTRY.

FORESTER with technical training and with several years' experience in administrative work and teaching, desires position along either of these lines. Address "B," Care AMERICAN FORFSTRY.

FOREST ENGINEER—Best of American and European training. Five years of practical work along lines of organization, administration, protection, cruising and appraising. Would like position with some large timber holding company, railroad, or municipal watershed. Best of references. Address "CRUISER," Care AMERICAN FORESTRY.

A forest school graduate with experience in U. S. Forest Service and with lumber company, also possessing thorough business training, will consider offer of a good forestry position. Address M., Care AMERICAN FORESTRY.

Graduate of Penna. State College Forestry School, with experience in U. S. Forest Service and with a big paper company, desires position with tree surgery and landscape gardening firm. Address H., Care AMERICAN FORESTRY.

Forester with wide experience in nursery work, planting, fire protection, etc., and also in park work, desires position. Best of references. Address U, Care AMERICAN FORESTRY.

FORESTER with 15 years experience Estimating, Surveying, Mapping, and in the care of private holdings desires position. Perfectly reliable in every way, and with executive ability. Address "A," care AMERICAN FORESTRY.